State Maternal Mortality Review
Accomplishments of Nine States

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Invitational Meeting on State Maternal Mortality Review
September 2003

In September 2003, the Safe Motherhood Partnership* and the American College of Obstetricians and Gynecologists sponsored a 2-day meeting for nine states with active maternal mortality review committees. We would like to thank the people who participated in this meeting for their contributions to this publication and for their ongoing efforts to improve women's health before, during, and after pregnancy.

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* The Safe Motherhood Partnership includes the Centers for Disease Control and Prevention's Division of Reproductive Health, the Health Resources and Services Administration's Maternal and Child Health Bureau, and the Association of Maternal and Child Health Programs.

Acknowledgments

We would like to thank Courtney Bourne and Annette Phelps for facilitating the 2003 Invitational Meeting on State Maternal Mortality Review. We also would like to thank Carol Graham and Betsy Wood for organizing the information from the meeting and writing the preliminary draft of this publication.

Contents

Introduction

Although maternal mortality is a relatively rare event in the United States, each year an estimated 1,000 American women die of pregnancy-related complications such as hemorrhage, embolisms, and hypertension. These deaths are devastating to these women's families, and they have a profound impact on health care providers and communities. About half of these deaths are believed to be preventable. Despite advances in medical care and increases in prenatal care, the U.S. maternal mortality ratio has not decreased in more than 20 years.[1] Furthermore, the maternal mortality ratio for African American women has been three to four times higher than the ratio for whites since 1940.[2]

In 2001, the Centers for Disease Control and Prevention's Division of Reproductive Health (CDC/DRH), the Health Resources and Services Administration's Maternal and Child Health Bureau (HRSA/MCHB), and the Association of Maternal and Child Health Programs (AMCHP) formed a Safe Motherhood Partnership to help states develop coordinated approaches to promote and enhance women's health before, during, and after pregnancy. One of the partnership's first priorities was maternal mortality.

In September 2003, the Safe Motherhood Partnership, along with the American College of Obstetricians and Gynecologists (ACOG), sponsored a 2-day Invitational Meeting on State Maternal Mortality Review (hereafter called the Invitational Meeting) for nine selected states with active maternal mortality review (MMR) committees. MMR is one method that states can use to better understand the clinical factors, gaps in services, and systems problems that lead to maternal death.

The meeting focused on four topics, which were identified at an MMR workshop at the AMCHP Annual Meeting held in March 2003. These topics included the structure and process of MMR, data and definitions, dissemination and implementation of review findings, and ways to develop and sustain an MMR. The goal of the Invitational Meeting in September 2003 was for the nine participating states to describe challenges, lessons learned, and promising practices from their MMR experiences in relation to these areas. This information could then be shared with states interested in starting a new MMR process or strengthening an existing one. Meeting participants included state health department representatives and obstetricians/gynecologists from Florida, Massachusetts, Michigan, New Jersey, New Mexico, New York, North Carolina, Utah, and Virginia.

The purpose of an MMR is to examine the circumstances of women's deaths that occur during or around the time of pregnancy and to identify gaps in services and systems that should be improved to prevent future deaths. MMR also can identify strengths in the system of care that should be supported or expanded. Traditionally, MMR committees had their roots in state medical societies. Today, however, most MMR committees operate under the leadership of a state health department, and

they are becoming more interdisciplinary in their membership. This change can result in a broader examination of systemic health issues—in addition to the clinical risk factors—related to a woman's death.

In 2001, CDC and its partners published *Strategies to Reduce Pregnancy-Related Death: From Identification and Review to Action.*[3] These partners included ACOG, HRSA/MCHB, AMCHP, the American College of Nurse Midwives, CityMatCH, and the National Association of Public Health Statistics and Information Systems. This publication provided information on the MMR process, including how to identify and review cases, analyze data, and disseminate results.

To build on this work, CDC and its partners now offer *State Maternal Mortality Review: Accomplishments of Nine States.* This new publication provides real-life examples and experiences of nine states related to the MMR process in the areas of 1) MMR committee structure, organization, and composition; 2) data collection; 3) dissemination and implementation of findings; and 4) guidelines for improving MMR programs. It also includes guidelines for starting an MMR, explains why state-based MMRs are useful, and provides appendices of supporting and sample documents. The information presented in this publication will benefit states with all levels of expertise and experience in MMR.

Chapter 1

The Structure of Maternal Mortality Review Committees

Key Points

- Maternal mortality review (MMR) committees should be based in a state agency, such as the health department, to create legal protections, establish programmatic neutrality, and foster beneficial partnerships.
- To be most effective, MMR committee membership should be multidisciplinary and represent both professional and geographic diversity.
- States need to be creative to cover the costs of the MMR process and to develop incentives for volunteers who serve on MMR committees.

History of State-Based Maternal Mortality Review

During the early 1900s, many states had some form of maternal mortality review (MMR). As pregnancy-related deaths decreased, so did the number of committees. In recent years, a renewed interest in the mortality and morbidity associated with pregnancy has led to an increase in the number of active MMR committees. Today, MMR committees and processes are as varied as the states in which they function. Some have been in existence for up to 70 years, while others are just beginning.

In many states, MMRs were initially conducted by a medical society or state health officer for the purpose of identifying death trends and educating health care practitioners. Most committees have now evolved from a group of obstetricians reviewing only clinical aspects of maternal deaths to multidisciplinary teams that review medical as well as nonmedical factors, such as environmental, social, and economic factors, through a more structured process. These committees are based in a variety of settings and include multiple partners.

MMR Committee Placement

Strategic placement of MMR committees helps to ensure that key partnerships can be developed and the process sustained. In most instances, MMR committees operate within state agencies, usually the health department. (See Table 1.) However, committees also can be based in academic institutions, hospitals, or professional organizations such as medical societies or state ACOG sections.

Placement of MMR committees in state agencies is preferable for many reasons.

- The state is the locus of policy decisions that can reduce the number of maternal deaths, such as decisions on funding, resource allocation, organization of perinatal care, and dissemination of information.

- States can pass laws that offer legal protection to MMR committees, which other groups or institutions cannot.
- State-based reviews are more likely to expand their focus beyond clinical factors and collect information on nonmedical, environmental, social, and economic factors.

Other advantages include
- Access to key programs such as vital statistics, reproductive health, maternal and child health, and epidemiology.
- Increased ability to obtain and share data.
- Integration of findings into state programs.
- Ability to achieve programmatic neutrality, without limitation to any particular issue, project, institute, or facility.
- Access to federal Title V Maternal and Child Health (MCH) block grants and other funding resources.
- Increased ability to foster alliances with other government agencies and partners.

Table 1. MMR Committee Placement in States Participating in the September 2003 Invitational Meeting on State Maternal Mortality Review

State	Location
Florida, Massachusetts, New Jersey, New Mexico, Utah	Department of Health, Maternal and Child Health
Michigan	Department of Health, Epidemiology and Maternal and Child Health
New York	American College of Obstetricians and Gynecologists Department of Health, Bureau of Women's Health
North Carolina	Wake Forest University Department of Health, Center for Health Statistics
Virginia	Department of Health, Office of Family and Health Services and the Office of the Chief Medical Examiner

Function and Scope of Review

The overall purpose of MMR committees is to collect relevant information pertaining to maternal deaths, review the findings, and make recommendations to help prevent future deaths and improve maternal health in general. As part of this work, MMR committees collaborate with partners, such as state medical societies and hospitals, to disseminate the results of their reviews and develop needed interventions.

Some MMR committees limit their feedback to the health care practitioners and facilities involved in a maternal death. However, the MMR process is increasingly being used to identify systems problems that must be addressed in order to decrease the number of maternal deaths.

The MMR process is defined as a system for identifying, reviewing, and analyzing maternal deaths, and disseminating the results. The experience gained in developing an MMR process can become a model for other purposes. For instance, one state's MMR was considered a possible prototype for quality assurance by regional perinatal centers. The process included a comprehensive template of protocols and tools that could be used to review other sentinel events.

Maternal deaths are relatively uncommon. Some states, such as Utah, report very few maternal deaths annually (5–9), while others, such as Florida (60), report a much larger number. The criteria that states use to identify cases for review also vary. (See Table 2.) All but one state participating in the Invitational Meeting first identified deaths from all causes during pregnancy and within 1 year of pregnancy termination (i.e., pregnancy-associated deaths), and then selected cases to review from this cohort. (The definitions used by MMR committees will be discussed in more detail in Chapter 3.)

Table 2. Number of MMR Cases and Review Criteria Used by States That Participated in the 2003 Invitational Meeting on State Maternal Mortality Review

State	No. of Cases Reviewed*	Case Review Criteria
Florida	60	Stratified sample of pregnancy-associated deaths.†
New Jersey	50–55	All pregnancy-associated deaths.
North Carolina	50–55	All pregnancy-associated deaths.
Virginia	40–45	All pregnancy-associated deaths.
New York	40	All pregnancy-related deaths reported to the MMR committee by participating hospitals.§
Michigan	30–35	All pregnancy-associated deaths.
New Mexico	25–30	All pregnancy-associated deaths.
Massachusetts	20–25	All pregnancy-associated deaths.
Utah	5–9	All pregnancy-associated deaths.

* Number of cases reviewed per year as reported by the state MMR committee.
† The death of a woman while pregnant or within 1 year of termination of pregnancy, irrespective of cause.
§ The death of a woman while pregnant or within 1 year of termination of pregnancy from any cause related to or aggravated by the pregnancy, but not from accidental or incidental causes.

Committee Membership

As discussed previously, the MMR process is evolving from a single individual or groups of physicians looking for clinical causes of maternal deaths to a multidisciplinary team that evaluates other potentially contributing social, environmental, and systems factors. This transition is an important one, as it provides information on additional ways that the number of these deaths can be decreased. For this reason, committee membership should include experts in areas such as social health, in addition to the traditional fields of obstetrics, pathology, and epidemiology.

Representatives from other areas, such as domestic violence, law enforcement, community organizations, faith-based organizations, social work, and women's health also can add to the diversity of an MMR committee. Some states invite guest reviewers such as cardiologists, pulmonologists, and infectious disease specialists to participate in the process when needed. When possible, the committee should include state policy makers who can help develop and advocate for the MMR committee's recommendations. In addition, leaders in academia can make important contributions to the MMR process, as can others who are able to help with education, advocacy, and the implementation of findings. Although it may not be appropriate for consumers to serve on the MMR committee, they can provide valuable input for developing effective and culturally appropriate solutions to identified problems (such as gaps in services) to prevent future deaths.

The 2001 *Strategies to Reduce Pregnancy-Related Deaths* recommended that MMR committees include representatives from various disciplines and organizations.[3] A similar list based on input from participants of the 2003 Invitational Meeting is provided here. (See Appendix A, Professions and Disciplines Represented on Maternal Mortality Review Committees, by State, for more information.)

MMR committees should include

- Medical specialists, including obstetricians (9),* perinatologists (8), neonatologists (4), anesthesiologists (4), pediatricians (2), family practice physicians (2), and intensivists (2).
- State, county, and local health department staff (8).
- Midwives/nurse practitioners (8).
- Nurses (7).
- Medical examiners (6).
- Epidemiologists/biostatisticians (6).
- Pathologists (5).
- Social workers/mental health counselors (5).
- Public health/preventive medicine specialists (5).

Additional committee representation might include

- Universities and other academic institutions (3).
- Nutritionists (2).
- Paramedics (2).
- Police/law enforcement officials (2).
- Judges/lawyers (2).
- Hospital administrators (2).

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* Numbers in parentheses indicate how many of the nine states have representatives of each type on their MMR committee.

- Risk management specialists (2).
- Community maternal and child health organizations and minority advocacy groups (2).
- Medicaid program staff (2).
- Family planning providers (1).
- Clergy (1).

In addition to their own individual specialties, some committee members (not necessarily all) also should have
- Program and policy knowledge.
- Medical knowledge.
- Analytical experience.
- Communication and collaboration skills.

Other important factors to consider when building an MMR process include
- Members should represent different geographic areas and professional fields.
- Members should be able to represent their professions, organizations, or agencies and not just participate as individuals.
- Members should be respected by and able to effectively interact with the community.
- Members should be willing and able to consistently attend committee meetings and to reliably communicate information back to their organizations.
- Procedures for committee appointments and term limits should be established early.

For states that currently do not have an active MMR process—and that find the prospect of forming such a diverse committee overwhelming—one solution is to draw on existing groups performing similar work. For example, in several states, the members of the MMR committee also serve on the state's Fetal and Infant Mortality Review (FIMR) or Child Death Review (CDR) committees.

MMR Funding

The cost of conducting MMR depends on several factors, including the number of maternal deaths occurring in the state, the type and quantity of information being collected, and the existing infrastructure of the current MMR process. In general, MMRs are relatively inexpensive to conduct because much of the committee members' time is volunteered. However, states must consider specific costs, including
- Staffing and secretarial support.
- Data abstraction services.
- Communication services.
- Meeting expenses and travel costs.
- Postage and mailing.
- Office supplies.
- Photocopying, faxing, and printing.
- Data processing.
- Computer hardware and software.
- Incentives for committee members.

Identifying funding sources for the MMR process is a challenge to be met with innovative thinking. Many programs are pieced together on an in-kind basis, with no specific funding for conducting reviews or disseminating reports. Some dedicated MMR funding sources include Title V MCH Block Grants, state funds, and special grants or initiative funding. Funding for MMRs varies significantly among states, ranging from no allocated funding to $135,000 annually. Although most of the work performed by the MMR committee is voluntary, some paid positions do exist. (See Table 3.)

Table 3. MMR Positions and Funding Sources in States That Participated in the 2003 Invitational Meeting on State Maternal Mortality Review

State	Coordinator	Data Abstractor	Statistician	Administrative Support	Assistant
Florida		Per-case*			
Massachusetts					
Michigan		Per-case†	.5 FTE‡§		
New Jersey	.25 FTE*	.5 FTE and per case*			
New Mexico	1 FTE*				.75 FTE*
New York	1 FTE‖			.25 FTE‖	
North Carolina	University-funded				
Utah	.9 FTE*			.25 FTE*	
Virginia	.75 FTE*				

* Title V Maternal and Child Health Block Grant from HRSA/MCHB.
† MCH section of state health department.
‡ Full-time equivalent.
§ State general revenue (subject to change).
‖ State health commissioner's discretionary fund.

Because most of the work performed by MMR committees is voluntary, states should be creative in motivating members to actively participate in the process. Some states pay travel and meal expenses for committee members, while others emphasize the need for public recognition by the department of health or professional organizations. Continuing medical education credits can be an incentive for some committee members. Regardless of incentives, MMR committee members frequently become very committed to the MMR process, leading to a low turnover rate. Making a difference in the care and treatment of pregnant and postpartum women in order to reduce the number of maternal deaths is a goal that resonates well with many MMR committee members. Their work is essential to continuing the MMR process.

Review Process

Although the review format varies by state, the MMR process (detailed in subsequent chapters) usually includes

- Case identification and selection.
- Data abstraction.
- Case review.
- Development and presentation of a case summary.
- Development of committee findings and recommendations.
- Dissemination and implementation of recommendations.

Some states conduct limited (or medical) reviews at local levels (e.g., hospitals) and then send case summaries and findings to the statewide MMR committee for further evaluation and discussion. However, most cases are reviewed only at the state level. In both approaches, the committee is expected to develop recommendations to reduce maternal deaths and improve systems of care.

Chapter 2

Maternal Mortality Review Definitions, Data Sources, and Process

Key Points

- Clear and consistent definitions are critical to the MMR process.
- States should use multiple sources to collect data on maternal mortality cases, including medical records, vital statistics records, pathology reports, and social service records.
- States should establish legal mechanisms to obtain the data they need, protect the people involved in the process, and preserve the confidentiality of the data.

Definitions and Terms

Clear definitions are essential for an effective MMR process. Definitions and terms should be established at the outset and used throughout the various stages of the process (i.e., case identification, selection, data abstraction, review, summary). Although definitions may change over time, and they may vary by state, all reviewers and partners on an individual committee should use the same terms to ensure consistency. Doing so enhances surveillance of outcomes and factors related to maternal mortality and improves data analysis.

State MMR committees represented at the 2003 Invitational Meeting use two definitions developed by ACOG and CDC to classify deaths.

- **Pregnancy-related death:** The death of a woman while pregnant or within 1 year of termination of pregnancy from any cause related to or aggravated by the pregnancy, but not from accidental or incidental causes.
- **Pregnancy-associated death:** The death of a woman while pregnant or within 1 year of termination of pregnancy, irrespective of cause.

For a more detailed discussion of MMR terms and how they are defined, see Chapter 2 of *Strategies to Reduce Pregnancy-Related Deaths*.[3] Additional terms used by the states that participated in the 2003 Invitational Meeting include

- **Ascertainment:** The identification of deaths.
- **Not Pregnancy-Related Mortality:** The death of a woman while pregnant or within 1 year of pregnancy termination that was not caused by pregnancy.
- **Possibly Pregnancy-Related Mortality:** A pregnancy-associated death that has been reviewed, but that cannot be conclusively classified as either pregnancy-related or not pregnancy-related.

Case Identification

Accessing data sources and reviewing information to identify maternal mortality cases is crucial to the MMR process. Collaboration with the state vital statistics office is necessary, because death statistics serve as the beginning point for case identification. Death certificates for women of reproductive age (defined variously among states, but usually those aged 15–44 years) are often selected and reviewed for causes of death and any indication of pregnancy within the defined period before death. This process is electronic in many states, although some still review death certificates manually. Eighteen states currently have a pregnancy check box on the death certificate that helps identify women who died while pregnant or within a specified period following pregnancy.[4] The new U.S. Standard Death Certificate includes a box with questions about the relationship between pregnancy and the death.[5] As more states adopt this standard form, identification of pregnancy-associated deaths should increase.

Use of birth certificate data also can improve pregnancy mortality surveillance. Several of the states that participated in the 2003 Invitational Meeting can electronically link fetal death and birth records to women's death certificates to identify pregnancy-associated deaths. One state links death records with data from its universal prenatal screening program to identify these deaths.

If available, states should consider their state maternal and child health epidemiology program as a resource for data linkage. They also can identify cases by accessing information from computerized hospital discharge systems, as well as by requesting information from hospital administrators and labor and delivery departments. In addition, maternal deaths can be identified through the media (e.g., Internet, television, newspapers) and from personal reports from sources such as physicians, hospitals, and attorneys. A more detailed description of different methods of case identification can be found in Chapter 4 of *Strategies to Reduce Pregnancy-Related Deaths*.[3] (See Appendix B for a sample Memorandum of Agreement that can be used to formalize data collection agreements between state agencies.)

Case Selection

In smaller or less populous states, MMR committees can easily review all pregnancy-associated deaths because of the relatively low number of cases. However, in more populous states with greater numbers of maternal deaths, committees must establish criteria for deciding the number and type of cases they can feasibly abstract and review.

Some states review only those cases voluntarily reported, while others use random sampling procedures to select cases for review. Once a selection is made, additional or alternative cases may be chosen for review if problems occur in accessing records or if a case is missing relevant information. Many states do not review cases that are under legal review (e.g., suspected homicides, cases in litigation).

Access to Records

Relationships with key state and local partners are critical to gain and maintain access to records for MMR. Both committee members and their partners should understand that MMR committees do not exist to assign blame, and they have no legal authority to revoke licensure or take other punitive actions. Rather, their purpose is to strengthen systems of care for women and to decrease the number of maternal deaths. Continuous professional education about the MMR process helps to keep facilities and health care practitioners engaged and more willing to allow access to needed information.

Many states have statutes that enable access to records for public health research and epidemiologic purposes. However, none of the states attending the 2003 Invitational Meeting had laws specifically allowing access to records for MMR. In addition to reluctance or refusal of medical facilities to release records, a variety of special legal issues can impede such reviews. For example, obtaining access to records may be difficult when a federal agency or other independent entity (i.e., military bases, tribal nations) has jurisdiction over the hospital or geographic area in which a death occurred. Medical records and case reports for undocumented immigrants are often lacking. Obtaining law enforcement records for review can be particularly challenging. Law enforcement partners may choose not to participate in the MMR process if they are concerned about potential conflicts of interest if new information develops in an ongoing criminal case.

Strategies exist to overcome the potential legal issues involved in obtaining data for the review process. For instance, legislation that requires hospitals and health care providers to supply their records to the MMR committee would provide access to this information. Some states have developed ways to avoid problems that result from misinterpretation of the Health Insurance Portability and Accountability Act (HIPAA). In addition, the ACOG National Fetal and Infant Mortality Review (NFIMR) Program publishes information about HIPAA privacy regulations that states can use when conducting MMR.[6] Another strategy that states can use is to have an attorney write a letter on behalf of the MMR committee to physicians and hospitals clarifying the new privacy protections under HIPAA and asking them to include provisions for MMR when creating their protocols. The state health officer also can write a letter to accompany the request for permission to abstract data that states the purpose of the MMR process and identifies the MMR exemption from HIPAA regulations. (See Appendix C for a sample request form.)

Case Abstraction

The MMR coordinator, health care providers, paid or volunteer abstractors, or other committee members can perform case abstraction. All abstractors, regardless of experience, must be trained in form completion, data sources, and terminology to ensure uniform data collection.

The following data sources should be considered for abstraction and review:

- Birth and death certificates (including fetal and infant deaths).
- Prenatal records.
- Hospital records (e.g., labor and delivery and other hospitalizations).
- Autopsy reports.

- Medical records from the offices of primary care physicians and specialists.
- Social services records (e.g., case management, children's services records).
- Emergency medical services records.
- Newspaper articles.
- Medical examiner records.
- Postmortem toxicology records.
- Law enforcement records.
- Prenatal screening data.
- Fetal and Infant Mortality Reviews (FIMRs) and Child Death Reviews (CDRs).

In addition, interviews may be conducted with family members of the deceased woman and with the attending physicians or health care staff involved in her care. Although these interviews can be time- and labor-intensive, they provide the opportunity to collect valuable information that otherwise might not be available to the committee. However, interviews must be conducted in a way that does not place blame on the individuals involved.

Personal interviews, when conducted properly by a trained interviewer, also can help families and health care providers begin to work through the grieving process. One physician at the 2003 Invitational Meeting stated that physician-to-physician interviews might have a cathartic effect on a provider who has lost a patient.

Currently, no standard data abstraction tool exists for MMR committees to use. Some committees have created their own tools, including forms with quantitative and open-ended questions that may be easier for health care providers to complete. Many states have adapted forms from other programs, and some have used the NFIMR Program abstraction tool as a starting point. (See Appendices D and E for sample data abstraction forms as well as Appendices E and F in *Strategies to Reduce Pregnancy-Related Deaths*.[3])

Case Presentation

The MMR coordinator (or staff) often presents a case to the review committee as a written summary. A few states report that some committee members also play a role in abstracting the data, creating the case summary, and/or presenting the case to the full committee. All states use de-identified case summaries in their presentations. Some cases are provided to the committee as written summaries before the review meeting and discussion. Others are first presented orally, and then followed by a written case overview that includes findings and recommendations.

MMR Databases

States can create and use both case-ascertainment and case-review databases (using software such as Microsoft Access) to track and analyze their MMR data. Case-ascertainment databases or master files most often include all pregnancy-related or pregnancy-associated deaths, along with vital statistics data such as demographics and cause of death. These databases contain personal identifying information, and they assist primarily in the identification and selection of cases for review and for some analysis of maternal mortality issues. Case-review databases are de-identified, and they include data from the case-ascertainment database,

additional data collected through abstraction, and MMR committee findings and recommendations. MMR committees use the case-review database to analyze MMR findings over time and to identify recurring issues. Safeguards to ensure confidentiality and secure backup should be in place before data collection begins.

Recommended components of a minimum data set include
- Demographic data.
- Death certificate information, including cause of death.
- Gravidity/parity (i.e., number of pregnancies/births).
- Medical history, including prenatal care, any hospitalizations, and labor and delivery information.
- Any other contributing medical or social information.
- Birth outcome information when available.
- Synopses of committee findings.

Committees must consider the context of women's lives and the ways in which community and economic issues, access to care, and psychosocial issues affect a woman's health during and after pregnancy. Placing maternal mortality within a "life cycle" approach that examines other areas of women's health, including other medical and social conditions, can broaden interest in women's health and pregnancy and facilitate partnerships with other women's advocacy groups.

Information about the "preventability" of deaths also can be determined and included in a minimum dataset. Some states at the 2003 Invitational Meeting expressed concern that to officially classify a death as preventable could discourage provider participation or limit access to medical records. Some states limited their analyses to what they considered systems issues. However, one state published the results of its review, which assessed whether changes in various factors could have potentially led to the prevention of pregnancy-related deaths.[7]

One state reported that its committee had performed an intensive validation study of 4 years of case review data (approximately 240 cases). Four professional staff members worked on the study for numerous hours over a 3-month period. They identified several areas where improvement was needed to ensure data quality, including the need for better instructions for recording height and weight and the advantage of an electronic data validation system.

Another state is currently linking MMR data with other types of death reviews to create a comprehensive, statewide morbidity and mortality database. This database will include reviews of fetal and infant mortality, maternal mortality, and child mortality, as well as information from sudden infant death syndrome surveillance and electronic birth and death certificates.

Data Analysis

Case analysis should serve to improve understanding of both the medical and social circumstances surrounding maternal deaths. MMR committees should work with all available data to identify relevant factors and sequences of events, such as preexisting maternal health conditions, education of women regarding warning signs, accessibility and acceptability of health care, adherence to medical

advice, use of best practice interventions by health care providers, and community services.

Although it would be useful to quantify MMR findings, the number of maternal deaths is too low in most states to allow for meaningful statistical inferences. However, reporting MMR findings and recommendations is still critical to the overall quality improvement process for maternal and child health care systems. In areas where maternal deaths occur less often, reporting aggregate data from several years using composite cases or publishing detailed analyses on specific issues (e.g., injury-related deaths, access to health care) can provide useful information without compromising confidentiality.

Confidentiality and Immunity

Statutory legal protection and confidentiality must be ensured from the beginning of the MMR process to protect committee members and the collected data from lawsuits and subpoenas. The relatively small number of maternal deaths makes confidentiality requirements a special challenge. Even with the deletion of demographic data from a case summary, unique details of a maternal death may identify it to reviewers and the public upon release of the findings and recommendations. Special consideration must be given to these issues to ensure the privacy and protection of the women who have died, their families, their caregivers, and the committee members.

Care also must be taken when distributing case information to committee members for review, especially when using electronic media (e.g., e-mail, fax) to transfer information. Committee members should be required to sign privacy pledges or confidentiality agreements before participating in the review. (See Appendix F for a sample confidentiality agreement form.)

Some states have used one or more of the following policies to ensure confidentiality:

- Require that all abstractors and committee members complete training on confidentiality.
- Require that each person associated with the MMR process sign a confidentiality oath.
- Require that each committee member who receives individual case information sign an additional confidentiality oath (for that particular meeting and/or case).
- Do not record identifiers on abstraction forms.
- Provide abstracted information only to committee members who have indicated that they plan to attend the meeting in which a particular case will be discussed.
- Collect and shred all information regarding a particular case, including the case summary given to each committee member, at the end of each meeting.
- Do not discuss individual cases outside committee meetings.

Chapter 3

Dissemination and Implementation of Review Findings

Key Points

- Disseminating findings and implementing committee recommendations are important steps in the MMR process.
- States should disseminate MMR findings and recommendations in multiple ways, including through reports, publications, action alerts, and presentations.
- States will need to engage key partners to successfully translate MMR findings into action.

Disseminating Findings

Once the MMR committee has reviewed and analyzed the cases, its members should discuss how to disseminate the findings. This step is an important one in the MMR process because the ultimate purpose of MMR is action. (See Appendix G for a sample MMR recommendations and action plan form.)

Dissemination involves finding ways to educate health care providers, partners, and the general public about the causes of maternal mortality. Partners in this effort should include such organizations as

- Healthy Mothers, Healthy Babies coalitions.
- Fetal and Infant Mortality Review (FIMR) committees.
- State hospital associations.
- Faith communities.
- Domestic violence organizations.
- State chapters of health care provider associations, such as ACOG; the Association of Women's Health, Obstetric and Neonatal Nurses; the American Academy of Family Physicians; and the American Academy of Pediatrics.

MMR findings can be disseminated in many ways, including through

- Published reports of findings and recommendations.
- Presentations at professional meetings, inservice educational sessions, and public health conferences.
- Presentations to hospital emergency room and obstetrics departments.
- Grand rounds at hospitals and medical schools.
- Articles in professional journals and other publications.
- A speakers bureau whose members can reach different audiences.
- Printed articles, Internet postings, public service announcements, speaking engagements, posters, brochures, and billboards released through the media to the general public.

- Mailings to providers of health care services to women.
- Short informational alerts for health care providers that outline unusual or often-missed diagnostic or treatment opportunities related to pregnancy and childbirth.
- Evidence-based clinical guidelines for specific conditions.
- Compelling composite stories (with elements from various cases to maintain confidentiality) that illustrate important trends and capture audience interest.
- Educational materials for consumers and patients.
- Various groups such as grassroots consumer organizations, bereavement programs, faith-based organizations, professional associations, community and nonprofit organizations, federal and state agencies, and advocacy groups.

Implementing Recommendations

The overall goal of an MMR committee is to identify medical, systems, and patient issues that affect maternal mortality and to develop recommendations to improve women's health. Implementation requires outreach and education to health care providers, hospital administrators, policy makers, and others who can influence the funding, services, and policies that affect pregnant women. Involving partners such as maternal and child health organizations, coalitions, and provider associations is particularly helpful for advocacy and public education. Adequate data, funding, and staffing also are necessary to translate MMR findings into action.

States that participated in the 2003 Invitational Meeting recommended the following activities on the basis of their MMR findings:

- Conduct routine screening of pregnant and postpartum women for depression.
- Heighten awareness of the importance of proper management of chronic illnesses, such as high blood pressure and heart disease, during pregnancy.
- Identify issues unique to the treatment of pregnant women in emergency room settings.
- Advise hospitals to conduct mock emergency drills to identify and practice the roles of various staff members who participate in the care of pregnant women (e.g., who gets blood, who cares for the mother, who cares for the neonate).
- Educate health care providers about clinical care issues, such as the need to continue magnesium sulfate for 24 hours after delivery, the importance of the prompt use of antihypertensive medications, the importance of closely monitoring low blood platelet values, and the need for caution when inducing labor with an unfavorable cervix.
- Ensure that family planning issues are discussed early in a woman's care, especially for women with chronic illnesses.
- Promote seatbelt use for pregnant women through awareness campaigns for health care practitioners and the general public to reduce the number of pregnancy-associated deaths caused by motor vehicle crashes.
- Continue directing attention to racial disparities in maternal mortality.
- Address gaps in services, such as the lack of coordinated care.

As with other mortality reviews, implementation of recommendations is often more difficult than merely disseminating the findings. Reasons that state MMR committees have trouble translating recommendations into action include

- Funding to implement strategies is inadequate.
- Staff to oversee strategy implementation and evaluation are insufficient.
- Policy and decision makers have not been previously involved in the process.

- The MMR committee needs more data before it can develop specific action steps.
- Authority to implement certain strategies is insufficient.
- Too few channels exist to disseminate prevention guidelines and committee recommendations.

In spite of these challenges, many states have successfully moved beyond simply collecting and reviewing information and have been able to address specific problems. Change can often be accomplished through new regulations or policies, so MMR committees should work closely with legislators and other policy makers to implement their recommendations. MMR committees also can work with health care providers and hospital administrators to help them develop and implement appropriate transfer policies for pregnant and postpartum women and prepare for any adverse impact on occupancy and revenues. Hospital certification processes also should be explored for ways to make maternal health a factor in determining designations for facility care levels.

Table 4. Examples of MMR Findings and How They Were Implemented by States That Participated in the 2003 Invitational Meeting on State Maternal Mortality Review

- One MMR committee found that pregnant women with complications were not being referred to Level 3 hospitals or regional centers for care. As a result, regional perinatal regulations are being updated to strengthen maternal care policies and change the transport policy. The committee obtained support from Level 1 hospitals by pointing out that maternal transport was a recurrent issue. All hospitals were reviewed and resurveyed (including through random site visits) to ensure that their care levels were properly designated.
- One MMR program has used committee recommendations to develop education strategies for the public and health care providers. For example, a review of maternal suicides related to postpartum depression spurred the implementation of training on screening and treatment for depression during pregnancy for prenatal health care providers. The program also has published educational materials on postpartum depression for pregnant women.
- One state developed a public awareness campaign that emphasizes the proper use and placement of seatbelts by pregnant women. This campaign was prompted by MMR findings that an excessive number of maternal deaths in the state were caused by motor vehicle crash injuries. Billboards and posters were created (in English and Spanish) for women's health practitioners and public health offices to illustrate and explain the importance of proper seatbelt use during pregnancy.
- One MMR committee identified peripartum cardiomyopathy as a leading cause of death for pregnant women. As a result, committee members are developing an educational program to address this issue. They also identified the need to strengthen regional transport policies and to promote preconception care among consumers and health care providers.
- One state has increased screening for domestic violence and documentation of substance use/abuse as part of MMR and other review processes. This initiative included development of technical assistance guidelines, formal screening protocols, and associated training for public health staff on these issues.

In addition to the currently required Title V MCH Block Grant performance measures, states can negotiate additional performance measures on maternal mortality that give the issue visibility and encourage partnerships with other health programs. These performance measures also can be used to generate measurable goals and objectives that demonstrate the cost efficiency of MMR and its overall value to maternal health. For example, one state used its MMR data to successfully apply for several grants, including a women's health grant, a federal Healthy Start grant, and a grant to participate in an AMCHP Action Learning Lab. The state also noted that maternal mortality data are typically needed in comprehensive assessments of perinatal outcomes and women's health. (See Table 4 for other examples.)

More information on making and implementing recommendations to reduce pregnancy-related mortality is presented in Chapter 7 of *Strategies to Reduce Pregnancy-Related Deaths*.[3]

Chapter 4

Development and Maintenance of a Maternal Mortality Review Process

Key Points

- The MMR process needs adequate staffing and secure funding to become institutionalized and expand.
- MMR should expand to include morbidity, which could increase opportunities for collaboration and help decrease pregnancy complications.
- MMR committee members should understand the applicable statutory and legal protections of their states.

Funding and Staffing

Adequate funding and strong state support are critical to the ability of MMR committees to conduct reviews, communicate with health care providers and the public, and foster systems-level change. States have had to be creative in seeking funding, not only relying on traditional sources such as state general revenue or Title V grants, but also turning to private sources such as community and state philanthropic groups, foundations, professional associations, and large advocacy organizations.

To successfully expand existing efforts and develop new review projects, adequate staff time and dedicated funding are critical. Using public health and public administration graduate students or interns as part-time staff can help offset costs. All of the states attending the 2003 Invitational Meeting have relied on volunteers to provide innumerable services in support of the MMR process.

Focus on Morbidity

For each maternal death, many more women suffer severe or even life-threatening morbidity. Several of the MMR committees represented at the 2003 Invitational Meeting are considering expanding their reviews to include "near misses," which are defined as women who were critically ill during or directly following pregnancy, but who did not die as a result. Using a life cycle approach to women's health would help to increase awareness of maternal morbidity and mortality, and it might provide more opportunities to build relationships with other groups involved in women's health.

Morbidity reviews also can focus on specific conditions such as preeclampsia or group A streptococcal infections. States could prioritize the problems they review on the basis of causes of maternal mortality (e.g., cardiomyopathy, eclampsia, obesity) and address them one at a time, using data to bring attention to the issue.

Expanding MMR to include morbidity provides information that could lead to more effective prevention and intervention strategies, and it also could help states build larger partnerships to address more issues related to women's health.

Statutory and Legal Considerations

An important and often challenging aspect of the MMR process is the need to understand the legal issues involved in reviewing maternal deaths. Committee members must have in-depth knowledge of the statutory provisions in their states related to the collection and review of records; the protections provided for committee members, abstractors, and caregivers; and the requirements for confidentiality. If state statutes do not exist or do not adequately address MMR, resources exist to help states develop or revise appropriate statutory language. An overview of review provisions by state is provided in Appendix D of *Strategies to Reduce Pregnancy-Related Deaths*.[3]

Collaboration

Another way to ensure the success of the MMR process is to collaborate and share project experiences and innovations with other states and national organizations. (See Table 5 for suggestions.) Existing state MMR committees and entities such as CDC can provide mentoring to help states develop MMR committees and processes. States that have received this type of mentoring have reported that it helped them avoid many of the pitfalls that earlier MMR committees encountered.

Table 5. Suggestions for Enhancing MMR Collaboration, from States That Participated in the 2003 Invitational Meeting on State Maternal Mortality Review

For MMR committees in development
▪ Invite staff from CDC or from a state with an MMR committee to provide on-site technical assistance to your management team, health department staff, and MMR committee as you begin planning and implementing your MMR process. ▪ Contact states with MMR committees and ask them to share the tools they use to conduct reviews, produce reports, and create databases. ▪ Contact ACOG, AMCHP, HRSA/MCHB, and CDC for technical assistance and guidance as you begin the MMR process. Work with your state's medical society, specifically the state obstetric and gynecologic society and the state ACOG section, to gain buy-in from experts within your own state. ▪ Consider adding a state-negotiated performance measure (process or outcome) on maternal mortality to your Title V MCH Block Grant application.
For established MMR committees and national partners
▪ Consider yourself a resource for other states. ▪ Make special efforts to provide presentations on maternal mortality at local, state, and national conferences. ▪ Create an electronic listserv for maternal mortality and morbidity issues. This resource will allow states to easily and directly access information from other states and from national partners and to request and provide technical assistance among themselves. ▪ Publish information about data and strategies related to the MMR. ▪ Sponsor meetings that include representatives from existing MMR committees and from states interested in creating MMR committees. ▪ Identify states with high rates of maternal mortality, and work with these states to improve their review processes. ▪ Identify funding mechanisms for process and outcome evaluation.

Additional Technical Assistance Issues

In states with very low numbers of maternal deaths, multistate reviews may allow more in-depth analysis of findings. This type of data consolidation can provide a sample size large enough to identify trends and systems-related themes. A multistate process may be especially helpful for states with fewer staff members and financial resources to dedicate to MMR, as it allows states to share the staff time and expertise needed to conduct reviews.

Some states also may need technical assistance to disseminate and implement their MMR findings. In particular, they may need advice on different ways to reach policy makers, such as governors' offices, state legislatures, and local administrators of health care facilities. States also might need help translating their recommendations into prevention strategies and developing mechanisms for monitoring these strategies after they are implemented.

Chapter 5

Guidelines for Starting a State Maternal Mortality Review Process

Key Points

- When contemplating starting MMR, consider consulting the CDC or a state with a functioning system.
- Reviewing case summaries and identifying the problems that contributed to the death are key to developing appropriate strategies for change.
- MMR can provide valuable information on ways to improve maternal health and care.

This chapter is designed to help states with no established MMR process and little to no funding begin thinking about how to develop an MMR process. People frequently feel that they do not have enough funding to optimally conduct MMR. However, through creative use of existing resources, such as Title V MCH Block Grants and different types of in-kind contributions, states have managed to create and sustain viable MMR processes.

The guidelines offered here are broad suggestions based on the experiences of the nine states that participated in the 2003 Invitational Meeting. There is no single approach to developing a successful MMR program, and these guidelines should serve only as a starting point. States are encouraged to solicit guidance and technical assistance from states with established MMR processes. In addition, they can access information and guidance from the state overviews on pages 34–68 and Appendices A–G of this publication, as well as from *Strategies to Reduce Pregnancy-Related Deaths.*[3]

Step 1: Establish a small, manageable steering committee of key stakeholders to develop and initiate the process.
To begin the MMR process, you will need to convene a small group of committed individuals to make some of the necessary initial decisions. Key members of this steering committee may include representatives from the state department of health (including maternal/child/reproductive health), office of health or vital statistics, regional perinatal centers, public health epidemiology and statistical teams, the state's ACOG section and/or obstetric and gynecologic society, and the state medical examiner's commission. Others to consider include representatives from academic institutions with maternal and child health programs, state organizations for nurses and midwives, and the state's hospital association. This committee will only make initial decisions, so it does not need to represent all disciplines and stakeholders. A larger, more diverse group of people should be recruited later for the full MMR committee.

Step 2: Analyze your state code and relevant statutes to determine if protection or authority exists for MMRs. If not, explore steps that could be taken to advocate for changes in the state code.
Determining if statutes exist is crucial, as other steps might be contingent on whether MMR committees will have protection or authority for this work. ACOG and the NFIMR program have been helpful in identifying relevant statutes for states. Although state employees are prohibited from formal advocacy for legislative changes, representatives of state societies or organizations, such as the state's ACOG section or hospital association, usually have relationships with legislators or have paid lobbyists.

Step 3: Decide where the MMR program will be located.
Placing the MMR program within the state department of health is beneficial. Funding considerations often come into play when making this decision. If you plan to use Title V MCH Block Grant funds to ensure basic functioning, placing the program in the health department's maternal and child health (MCH) unit is recommended. In several states, the MMR coordinator's responsibilities are incorporated into the job description of an existing MCH unit employee. Administrative support and overhead costs such as postage and copying also may be included in the MCH unit's budget. In some states, data management support (e.g., development and management of databases, assistance with data analysis) also is incorporated into existing MCH job descriptions. Other arrangements might work for other states, depending on organizational structure, available resources, partners, and levels of expertise.

Step 4: Decide what confidentiality measures and protections need to be developed and implemented to ensure that all committee members understand the importance of strict confidentiality in relation to case information and that the committee members, data, and findings are protected.
Ensuring legal protection and confidentiality for the MMR process is challenging but essential. Measures should be developed and implemented at the beginning of the process to protect committee members, the abstracted data, and committee findings from legal problems. Consideration also must be given to the privacy of the families and caregivers of the women who have died. States can provide training and require participants to sign a confidentiality oath to help ensure confidentiality throughout the MMR process.

Step 5: Decide what defines a case and how cases will be identified.
The MMR committee must decide on the criteria that will be used to define cases for review and the methods by which it will identify such deaths. In some states, committee members begin by reviewing all pregnancy-associated deaths. States with very few deaths also may consider including maternal morbidity in their reviews. In addition to using death certificates to identify deaths, some states have developed comprehensive data-linking systems in which the state's office of health or vital statistics matches women's death records with birth or fetal death records. Some states also link women's death records to hospital discharge data. Other methods of identification include reports from medical examiners' offices, voluntary reporting from hospitals, and informal sources such as the media or personal communications from physicians or attorneys.

Step 6: Decide on the membership of the MMR committee.
Ideally, an MMR committee will be multidisciplinary and include 1) members with expertise and experience with the various factors that contribute to maternal deaths and 2) members who reflect the geographic diversity of the area. While interest in and enthusiasm about the MMR process are important, committee members also should be chosen as official representatives of groups or organizations. This will enable them to provide formal feedback to the groups they represent and to help develop and implement interventions.

Step 7: Decide who will convene MMR committee meetings, where they will take place, and how often.
Decisions regarding MMR meetings will depend on where the committee is located. If it is placed in the department of health, a staff member (usually the MMR coordinator) often convenes the meetings. The following factors should be considered when deciding where and how often the meetings will be held:

- Will meetings be statewide, and will they cover cases from the entire state? Or will separate "regional" meetings be held to review cases in different regions, followed by a statewide summary meeting? Both approaches have been used, and both have advantages and disadvantages.
- How many cases does the group estimate that it will review each year? If the number is higher than 50, quarterly meetings may be necessary. If the number is lower than 50, less frequent meetings may suffice.
- How will resources affect this decision? Will committee members be asked to pay for their own travel expenses? Will choosing a central location for meetings encourage better attendance? Would it be more cost-efficient to hold meetings in a location closest to the majority of committee members? Is there a location (meeting room or conference center) where the group could meet without charge?

Once the process is established and the committee begins holding regular meetings, all members should have a say in how times and places are chosen. Flexibility is essential to making the process work, especially when asking committee members to donate their time (and resources) in order to participate.

Step 8: Decide what format to use to abstract cases and prepare case summaries.
Abstraction forms and a case summary template are needed to facilitate data collection and discussion at case review meetings. When developing case abstraction forms, avoid the quest for the "perfect" abstraction tool. Once the MMR process is established, committee members may want to review and revise its tools periodically, as they determine what information is needed, what is desirable, and what is not needed.

The MMR coordinator should keep notes on suggestions for revising the abstraction tool, so committee members can periodically discuss these ideas. However, revising your review tools more than every few years can make analysis of trends difficult. You should have at least 2 years of data using the same abstraction criteria.

Step 9: Establish procedures to abstract cases and prepare case summaries.
The person who prepares the case summary does not necessarily have to be the same person who abstracted the case. Different states handle the process differently. However, a manual and protocol should be developed for abstractors and for those preparing the case summaries to ensure consistency of terminology, data abstraction, and case summaries. In addition, anyone who will have access to the identifying information related to each case must receive training in issues of confidentiality. Protocols and records of all trainings should be documented, and the MMR coordinator should maintain the records.

Step 10: Decide how case summaries will be presented.
Case summaries may be presented to committee members in writing before meetings, orally at meetings, or in writing at meetings. When deciding how to present these summaries, consider the following factors. Oral case summaries presented at meetings eliminate the decision of when and how to distribute written case summaries, as well as the time and resources needed to print, copy, and mail them. However, by providing written case summaries ahead of time, committee members can review and process the information and come to meetings fully prepared to discuss the issues surrounding each case. If written summaries are provided in advance, a system must be in place to ensure confidential delivery (e.g., overnight mail with mandatory signature confirmation of receipt) and disposal of summaries (e.g., by shredding them) that were sent to members who were unable to attend.

Step 11: Decide what kind of database or data compilation tool will be used to maintain information for analyses.
Creating and maintaining a database is necessary for data analyses. Regardless of where the MMR committee is located, give careful consideration to where the database will be housed, who will be responsible for maintaining it, and who will have access to it. Identifying one person to be in charge may help to maintain confidentiality and adherence to case and variable definitions. This person also will become familiar with the strengths and weaknesses of the data and will be a valuable resource for research and analyses. You also should develop strict protocols for data storage and access.

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Epilogue

This publication summarizes the experiences of nine states with active MMR committees. We hope that it indicates the value of conducting MMR to reduce the number of pregnancy-related deaths. The experiences of the nine states that participated in the 2003 Invitational Meeting indicate that placing MMR committees in the state health department is beneficial. They also support the recommendation that MMR committees should include a diverse mix of professionals—not only from the medical field but also from the psychosocial arena and the community. MMR is generally not costly to conduct, and it can lead to collaborations and lasting partnerships with experts from many areas. These partnerships are needed to widely disseminate and successfully implement review findings.

Our society depends on the health of women. Although many maternal deaths are preventable, we do not fully understand the reasons behind these tragic events. State MMR will continue to play a critical role in the identification of risk factors and the prevention of future maternal deaths.

State Overviews

This section provides more detail on the MMR process in each of the nine states that participated in the 2003 Invitational Meeting. This information was obtained during the meeting and from follow-up interviews with committee members from each state.

Florida

Program Title
Florida Pregnancy-Associated Mortality Review (PAMR)

Inception Date of Current Process
The present multidisciplinary review process was developed in 1996. Before 1996, Florida had a simple review system that was conducted by the state health officer and supported by occasional collaboration with the Florida Obstetric and Gynecologic Society.

Program Base
Florida Department of Health (FDOH); Infant, Maternal, and Reproductive Health Unit (Title V agency)

Lead Staff
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Number of Cases Reviewed per Year: 60

Key Accomplishments to Date
- Developed, produced, and disseminated data reports.
- Used key findings and recommendations to highlight maternal health concerns in other initiatives (e.g., chronic disease prevention) and to work to decrease racial disparities in health outcomes.
- Used key findings to develop technical assistance guidelines for county health departments on the importance of preconception health.
- Developed technical assistance guidelines, screening protocols, and training on domestic violence issues for public health staff.
- Created standard slide presentations that committee members can use to educate health care providers and other partners.
- Published findings in 1) state newsletters that reach members of the Florida Obstetric and Gynecologic Society, members of the Florida Hospital Association, and other public health professionals and 2) an FDOH newsletter that highlights minority health concerns.

Staffing

- The PAMR coordinator, who devotes about 25% of her time to this project, is supported by a Title V MCH Block Grant. The grant also pays for data abstraction and travel expenses for abstractors and for secretarial support.
- Data and evaluation staff are funded by an SSDI grant.
- The state's vital statistics office helps with data collection.
- Other FDOH staff members who serve as volunteer committee members include two nurses and a social worker.

Review Process Summary

- The PAMR process includes a case ascertainment database and a case review database. Each quarter, cases eligible for review are identified (about 180 annual deaths), of which 60 are abstracted and reviewed.
- Death certificates for selected cases are reviewed by a physician to determine whether the deaths were pregnancy-related, possibly pregnancy-related, or not pregnancy-related.
- A stratified random sample of cases is selected for abstraction and review.
- Selected cases are distributed to local nurses, who abstract information from available records related to the death. This information is then collapsed into a brief case summary for committee review.
- Case review summaries are mailed by secure overnight delivery or hand-delivered to committee members who plan to attend quarterly meetings.
- Cases are reviewed at quarterly statewide committee meetings. Summary data sheets are created to outline major issues, identify strengths and gaps, and make recommendations.
- Data are entered into the PAMR database.
- Publications are generated from the data.

Review Team/Committee

Who convenes the process?
The PAMR coordinator, who is a registered nursing consultant with the FDOH's Infant, Maternal, and Reproductive Health Unit.

Who makes up the review committee?
Membership includes representatives of local health departments, universities, private practices, hospitals, state associations, the state medical examiner, and Florida Healthy Start coalitions. Disciplines represented include social work, pathology, obstetrics, gynecology, nursing, epidemiology, health department administration, pediatrics, nurse midwifery, and neonatology. Other committee members may be recruited depending on identified needs. Some members represent more than one discipline, such as domestic violence and social work.

How are members selected?
The PAMR committee includes volunteers and FDOH staff funded by state and federal sources. Some organizations and associations pay travel expenses for the committee members that represent their groups, while other committee members pay their own expenses.

The FDOH has maintained positive relationships with key partners and has found them willing to replace members when needed, which helps to keep organizations engaged in the process. Several key members have participated since the inception of the PAMR process, which offers the group the advantage of historical memory.

Case Identification

Initial data are collected from vital statistics and universal prenatal screening records. They include all females aged 8–61 with any one or more of the following:

- Death that occurred within 365 days of live birth or fetal death.
- Cause of death on the death certificate indicating that it was linked to pregnancy.
- A death certificate indicating that the woman was pregnant within 3 months of her death.
- A death certificate that is matched with a Healthy Start Prenatal Risk Screening Instrument.

Each quarter, all death certificates for women with a pregnancy-associated death are provided to the PAMR coordinator. From these cases, 15 are selected for committee review. A team of nurses and physicians first reviews the death certificates to determine if the deaths are pregnancy-related, possibly pregnancy-related, or not pregnancy-related. The goal for the final selection of cases is a group that includes 60% pregnancy-related deaths, with the remaining cases chosen through stratified random sampling to capture three each of the "possibly pregnancy-related" and "not pregnancy-related" cases each quarter. This process allows the PAMR committee to review all deaths identified as pregnancy-related and a sample of deaths identified from the other two categories.

Data Reviewed

- Death certificates.
- Prenatal medical records.
- Hospital records.
- Autopsy reports.
- Healthy Start records.
- Law enforcement records.
- Emergency medical services records.
- Other records as available (e.g., from other social service groups or agencies).

Abstraction Process

A physician on the PAMR committee assists with a preliminary review of death certificates. These death certificates are then sent to abstractors throughout the state, who access available records related to the death. Abstractors complete the abstraction form and then collapse the data into a brief summary for committee

review. At the quarterly PAMR meetings, one person facilitates the review process to bring the committee to consensus on findings and recommendations. When no supporting data are available for a particular case, it is recorded as having "no source data" to document the absence of a complete review.

Format of Data Presentation

Written case summaries are prepared by abstractors and distributed to committee members before quarterly review meetings. Recommendations and findings are recorded at the meeting and added to the PAMR database.

Additional Analysis Related to MMR

PAMR staff members have performed a special analysis related to obesity and a pilot content analysis of gaps and recommendations identified by the PAMR committee.

Dissemination of Findings

- Published reports (biannual).
- Presentations at conferences and meetings.
- Publication in newsletters.

Implementation of Findings

- Committee members may implement changes in local settings or through affiliations such as universities.
- Action plans may be developed around a specific issue. For example, PAMR recommendations on preconceptional health helped guide development of technical assistance guidelines for preconceptional counseling and education for county health departments.

Technical Assistance Needs

- Limited staffing is a challenge.
- More disciplines need to be represented on the PAMR committee. Examples include emergency room physicians, emergency medical technicians, representatives from managed care organizations, and members of the clergy.

Key Recommendations

- Access all available technical assistance from national and state partners.
- Bring a broad base of key partners and stakeholders into the process at or near its inception to help create sustained interest and commitment.
- Continue to monitor the impact of obesity on maternal morbidity and mortality.
- Make depression screening of pregnant and postpartum women routine.
- Increase awareness of the importance of managing chronic illnesses such as high blood pressure and heart disease during pregnancy.
- Focus attention on racial disparities in maternal mortality.
- Address gaps in the coordination of care for pregnant women.
- Educate emergency room staff about proper ways to treat pregnant women.
- Educate health care providers about the need to address family planning early when they care for women, especially women with chronic illnesses.

Massachusetts

Program Title
Massachusetts Maternal Mortality and Morbidity Review

Inception Date of Current Process
1998 in its current form

Program Base
Massachusetts Department of Public Health (MDPH); Bureau of Family and Community Health (Title V agency)

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Number of Cases Reviewed per Year: 20–25

Key Accomplishments to Date
- Raised awareness of injury-related maternal deaths, particularly those that involve violence and substance abuse. Massachusetts held a public health summit with key stakeholders and maternal mortality review (MMR) committee members to examine injury deaths.
- Published reports of committee findings, which brought recognition for the members' work.

Staffing
- Staff time for the record review process is estimated as follows: administrative assistant 25%; RN, PhD 10%; and RN, MPH 10%.
- More time is needed to prepare reports and presentations.
- This program has become part of the job description of several current staff members in the MDPH, who perform a variety of other functions and who are funded by the Title V MCH Block Grant.

Review Process Summary
Clinicians are responsible for case reviews, summaries, and presentations. They also participate in case discussions and suggest recommendations. Each case is assigned a primary and secondary reviewer.

MDPH staff in the Bureau of Family and Community Health coordinate all aspects of the MMR process. Responsibilities include obtaining medical charts, checking case studies for completeness, assigning cases to reviewers, following up on issues found during review, finding additional reviewers if second opinions are needed, analyzing data, and performing communication activities (e.g., developing presentations and reports, communicating with committee members). Cases are reviewed twice a year.

Review Team/Committee

Who convenes the process?
The commissioner of the MDPH and the chair of the MMR committee.

Who makes up the review committee?
All reviewers are volunteers, and the committee includes representatives from obstetrics, maternal/fetal medicine, nurse midwifery, obstetrical anesthesia, pathology, family practice, the state medical examiner's office, intensive care, health care quality, and the state Medicaid program. Guest reviewers include cardiologists, neurologists, emergency room physicians, nurses, administrative assistants, and the state's MCH epidemiologist.

Members also represent various state regions, different levels of hospitals, specialties in obstetrics/gynecology, private practice doctors, academia, and a cross section of health care providers. In addition, review subcommittees develop recommendations on substance abuse, domestic violence, and motor vehicle deaths.

How are members selected?
All non-MDPH members are appointed by the MDPH commissioner. Each member serves a renewable 2-year term. Representatives include key stakeholders, consumers, and health care providers. Current committee members are consulted for nominations for new appointments. Special care is given to ensure representation of academic programs, as well as diversity in race, ethnicity, and sex.

Case Identification

Death certificates for women of reproductive age are linked with those of women giving birth to identify pregnancy-associated deaths. Massachusetts mandates reporting of women who die in a medical facility if pregnant or within 90 days of the end of a pregnancy. Death certificates are reviewed manually, and *International Classification of Diseases* pregnancy-related codes are examined. Domestic violence advocacy groups also help with case identification.

Data Reviewed

Case information comes from birth and death certificates (electronic and paper), medical records of birth and death hospitalization, prenatal care records, reports from the state medical examiner, and newspaper reports.

Abstraction Process
MDPH staff in the Bureau of Family and Community Health coordinate all aspects of the MMR process. Primary and secondary reviewers look at the medical charts collected and abstract relevant data using a detailed form for both qualitative and quantitative data.

Format of Data Presentation
Individual MMR committee members are assigned as primary and secondary reviewers for each case. The primary reviewer summarizes the case and presents an oral overview to the full committee at the quarterly meetings. The secondary reviewer adds information as needed, and the state medical examiner brings any pertinent reports from his/her files. Committee members ask questions and discuss each case at the meetings. Complete case summaries are developed after the meetings.

Additional Analysis Related to MMR
The MMR committee is working with an MCH epidemiologist to add trend data to its annual report. The committee also is working with a school of public health to create a morbidity database. In addition, mortality data are being linked to birth certificate data to compare information about women who died with those who did not die. This additional analysis will be conducted after the MMR.

The committee also is considering an analysis of race and ethnicity variables because of the diversity of the state's urban areas.

Dissemination of Findings
The MMR committee publishes two reports—one on medical causes of death and one on injury causes. The goal is to issue major reports every 3–5 years, with more frequent brief updates as necessary. Findings also are presented at grand rounds and conferences and to other groups interested in the health of women.

Implementation of Findings
MMR findings and recommendations are implemented
- Through work with academic health centers to ensure training on quality of care for services that are provided to all women.
- By providing data to partners and advocacy groups.
- Through contractual work with community health centers.
- By including maternal mortality in grant applications.

Technical Assistance Needs
More dedicated staff time and funding to conduct process and outcome evaluations are needed.

Key Recommendations

- Improve access of low-income women to adequate prenatal care by increasing the number of health care providers who accept Medicaid. This process should involve the health care provider community, policy makers, community leaders, and social service programs that serve low-income communities.
- States that are planning to start an MMR process should obtain technical assistance early from another state or CDC.
- Ensure from the beginning that you have buy-in from local health care providers.
- Ensure dedicated staff time and funding to evaluate the MMR process and its outcomes.
- Review state statutes to ensure a comprehensive understanding of the existing parameters for the MMR process.
- Create partnerships with professional and advocacy groups committed to women's health.
- Work to create a data linkage process to ensure routine surveillance.

Michigan

Program Title
Michigan Maternal Mortality Surveillance (MMMS)

Inception Date of Current Process
1950

Program Base
Joint program of the Division of Epidemiology Services in the Bureau of Epidemiology and the Division of Family and Community Health in the Bureau of Family, Maternal, and Child Health, both of which are located in the Michigan Department of Community Health (MDCH).

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Medical consultant and chair of the Medical Review Committee: James W. Gell, MD
Medical consultant and chair of the Injury Review Committee: Joseph Moore, MD

Number of Cases Reviewed per Year: 30–35 (about half of pregnancy-associated cases). The Medical Review Committee reviews Michigan pregnancy-related deaths. The Injury Review Committee has begun to review cases again. Officials project that all pregnancy-associated deaths will be reviewed each year.

Key Accomplishments to Date
- Developed an electronic maternal mortality file of 1999–2002 deaths linked to birth certificate data through a collaboration between the Bureau of Epidemiology and Vital Statistics.
- Continued development of an interdisciplinary review process.
- Received Health Resources and Services Administration funding to analyze linked birth certificate/inpatient data for maternal morbidity and to develop data-driven intervention strategies to reduce pregnancy-related morbidity and mortality.

- Developed a 10-year retrospective of births and maternal deaths for 1990–1999.
- Published articles on ectopic pregnancy deaths and results of the medical review process.

Staffing

Paid staff include two medical consultants and one nurse consultant who work part-time by contract, as well as part-time vital records, data, and clerical support. Committee members donate their time and pay their own travel expenses. Staff costs, medical consultation costs, and meeting costs are funded from the Title V MCH Block Grant.

Review Process Summary

The MMSS process includes two committees, whose processes are outlined below.

Medical Review Committee: The staff prepare a case summary for each pregnancy-associated maternal death using appropriate data. This summary is presented to the full committee and discussed. The committee decides if the death is pregnancy-related and rates its "preventability" with a Likert scale (i.e., "definitely preventable," "possibly preventable," "probably preventable," "probably not preventable," and "definitely not preventable"). The committee also indicates what elements of preventability were present or absent, such as actions by the medical care staff, the medical facility, the patient, or the community. The committee assigns a cause of death, which may differ from that on the death certificate.

Injury Review Committee: The staff prepare a case summary for each pregnancy-associated death that is not pregnancy-related. The committee chair reviews and prepares the case summary of medical records for all suicide, homicide, substance abuse, or other injury deaths where questions about preexisting or medical factors exist. Screening and referral for domestic violence, depression, substance abuse, and other medical concerns are noted. Original police and fire department reports are de-identified and provided. Case materials are mailed in advance to each committee member. Individual members present cases for review by the full committee. Contributing and preventability issues are identified and documented for each death.

Review Team/Committee

Who convenes the process?
MDCH staff and committee chairs.

Who makes up the review committee?
Medical Review Committee: Disciplines represented include obstetrics/gynecology, perinatology, midwifery, maternal/fetal medicine, intensive care, anesthesiology, pathology, and nursing.

Injury Review Committee: Membership includes representatives from obstetrics/gynecology, injury prevention, midwife education, obstetric nursing education, public health nursing, and schools of social work and public health. State agencies and groups represented include domestic violence, law enforcement, the Michigan Office of Highway Safety, the state prosecuting attorney, and the circuit court.

How are members selected?
Committee members are volunteers who possess the required expertise for case reviews. Recommendations for members come from key state and local partners.

Case Identification

The MMMS is not mandated by specific language in the Michigan Public Health Code but is administered under the general public health code language on surveillance. Hospitals and other medical facilities are not obligated to report deaths or send data. Each year, the MMMS committee sends letters to hospital CEOs, medical records and labor and delivery departments, and medical examiners requesting this information. Cases also are identified from newspaper obituaries and informal reporting. Deaths are reported by hospitals, medical examiners, and nosologists through manual reviews of death certificates. They also are identified through the match of birth and death certificates. Phone calls and the Internet are helpful in getting information about families.

In the past, cases were not always easily identified. The Bureau of Epidemiology and Vital Statistics collaborated to develop an electronic maternal mortality file of 1999–2002 deaths linked to birth certificates data. Cases in which pregnancy ended in a fetal death were identified from hospital reports and added to the linked file. Pregnancy-related deaths not found through either of these methods were identified by *International Classification of Diseases* codes (i.e., pregnancy-related causes) from death certificates. These cases also were added to the linked file. This linkage process was found to be an effective method to identify and track cases in a state such as Michigan where maternal mortality reporting is not mandatory.

Data Reviewed

Sources of data include maternal and fetal death certificates; infant birth certificates; prenatal care and postpartum visit records; hospital labor and delivery, inpatient admission, and emergency department records; medical examiner/autopsy reports; police reports, if appropriate and accessible; and fire department reports, if appropriate. The use of records from prosecutors is being explored.

Abstraction Process

Nursing staff members retrieve case information and produce a basic case summary for medical and nonmedical case reviews. Medical consultants prepare a case-specific narrative that documents the medical information that the full Medical Review Committee will review. All nonmedical pregnancy-associated case summaries are reviewed by the Injury Review Committee, and medical case summaries are presented by the medical consultant. A process for documenting and aggregating information from completed case reviews is under development.

Format of Data Presentation
A narrative summary that describes each case.

Additional Analysis Related to MMR
Because MMRs provide opportunities to examine health disparities and identify important findings, committee members would like to produce hospital- and community-level reports on maternal morbidity in the future.

Dissemination of Findings
Facilities where maternal deaths occur do not receive direct feedback because individuals and facilities cannot be identified. Aggregate data are used for grand rounds, poster presentations, reports to MCH programs, reports to hospitals, and peer-reviewed articles. Presentations are made at state meetings (e.g., ACOG) and the state medical society to reach subspecialists such as emergency room physicians. The committee also works with the state's four medical schools to reach residents and make presentations at grand rounds.

Implementation of Findings
A more systematic approach to using committee recommendations to develop action strategies is needed.

Technical Assistance Needs
- Lack of dedicated staff time and funding for process and outcome evaluations are the main challenges.
- Making progress on key recommendations also is a challenge.

Key Recommendations
- Improve and expand case reviews. Additional sources of data are needed to understand both the medical and social circumstances of maternal deaths.
- Understand the effects of multiple factors on the sequence of events that leads to pregnancy-related deaths. These factors include preexisting maternal health conditions, women's knowledge of warning signs, accessibility to and acceptability of health care, adherence to medical advice, use of best practice interventions, and existing community services.
- Explore serious life-threatening complications of pregnancy, develop registries when necessary, and analyze morbidity data.
- Ensure interdisciplinary expertise to conduct MMR.
- Encourage collaboration among the medical and nonmedical communities to identify best practice interventions.
- Identify the differences that contribute to higher mortality among black women and develop specific interventions for this population.
- Continue to improve surveillance and conduct additional research.
- Engage key stakeholders who can guide the process, provide expert case review, help with education and advocacy, and commit to reducing maternal deaths.
- Work more closely with MDCH staff to 1) develop broad recommendations that address system changes, 2) find the resources to accomplish needed changes, and 3) measure progress in reducing maternal deaths.

New Jersey

Program Title
New Jersey Maternal Mortality Review

Inception Date of Current Process
New Jersey was the second state to institute a maternal mortality review (MMR) process. In 1932, the process began through the Medical Society of New Jersey. In 1970, the New Jersey Department of Health and Senior Services partnered with the medical society. In 1999, the process was revised to more closely resemble the Fetal and Infant Mortality Review (FIMR) model, and the state now uses a steering committee to oversee the process and a multidisciplinary team to review cases.

Program Base
New Jersey Department of Health and Senior Services (NJDHSS); Division of Family Health Services; Maternal, Child, and Community Health Program; Reproductive and Perinatal Health Services

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Number of Cases Reviewed per Year: 50–55

Key Accomplishments to Date
- Moved from a primarily physician-based review process to a multidisciplinary process.
- Improved case identification by nearly 50% by using probabilistic matching techniques.
- Improved the information available for review by collecting all hospitalization records for each case instead of only those related to labor and delivery and death.

Staffing
The New Jersey Maternal Mortality Review Steering Committee provides oversight and advice for the MMR process. A nurse working in the NJDHSS serves as state coordinator, spending about 30% of her time on this program. Data abstraction is performed primarily through contract with one of the maternal and child health consortia in the state. When additional help is needed, the state coordinator also abstracts data and prepares case summaries.

At the maternal and child health consortium, a nurse coordinates data abstraction, which takes about 50% of her time. When needed, contract data abstractors throughout the state also are used.

The Title V MCH Block Grant funds this process, paying for .3 FTE for the state coordinator and providing money to pay the maternal and child health consortium. The latter funding pays for a .5 FTE nurse position, contract data abstractors, and program expenses such as room rental and meals for the case review team. Contract data abstractors are paid up to $250 per case, depending on the complexity of the case (i.e., number of records to be reviewed).

Review Process Summary

In collaboration with the chair of the case review team, the state coordinator sends out meeting notices and agendas. The chair convenes review team meetings, and the state coordinator provides staff support. Meetings are held quarterly, and 10–15 cases are reviewed. Deaths are classified as pregnancy-related, not pregnancy-related, or undetermined. Cause of death is reviewed and modified as needed by the review team.

Review Team/Committee

Who makes up the review committee?

Steering committee members are volunteers and represent the following disciplines: physician (obstetrics/gynecology, neonatology, maternal/fetal medicine specialist, critical care/intensivist, anesthesiology, public health, and perinatal pathology), medical examiner, public health nurse, substance abuse counselor, family planning provider, social worker, mental health professional, clergy, risk/safety manager, obstetrics nurse, certified nurse midwife, paramedic, hospital administrator, minority advocate, and nutritionist. The steering committee includes 10–12 obstetricians/gynecologists who represent different areas of the state.

How are the members selected?

The nomination process used begins with a call sent out by the steering committee. Committee members are nominated for inclusion on the case review team. The steering committee reviews the nominations and makes final recommendations, making sure that team members will represent diverse disciplines and geographic areas of the state. Several of the physicians also represent professional organizations such as the state medical society, the American College of Obstetricians and Gynecologists (ACOG), and the New Jersey Obstetrics and Gynecology Society.

Case Identification

All pregnancy-associated deaths are reviewed. MMR staff work with the state maternal and child health epidemiology unit to link death, birth, and fetal death certificates. Electronic birth certificates are linked with death certificates and hospital discharges. Medical examiners also provide information.

Identification methods include direct notification from hospitals and medical examiner offices; information from death, birth, and fetal death certificates; newspaper articles; and a probabilistic match of electronic death, birth, and fetal death certificate data and hospital discharge data files. All identified cases are reviewed by the state coordinator to ensure a good match before progressing to data abstraction. Hard copies of death certificates are reviewed, and if necessary, identifying information is matched with medical records through contact with records departments at the appropriate hospital. Once cases have been confirmed, information is forwarded to the contract agency, which then coordinates the data abstraction process.

Data Reviewed

Data are abstracted from several sources, including death, birth, and fetal death certificates; autopsy and toxicology reports; medical examiners' reports; emergency medical service reports; labor and delivery records; prenatal care records; clinic records; emergency room and inpatient hospitalization records; and rehabilitation/long-term care admission records. Emergency room, inpatient, and rehabilitation/long-term care records are abstracted for a period from 1 year before the index pregnancy until the death of the mother, regardless of whether she was pregnant at the time of hospitalization. In some cases, letters are sent to primary care providers requesting any additional information they can provide that would assist in the case review.

Abstraction Process

Data abstraction is performed through a contract with one of the maternal and child health consortia in the state. A nurse coordinates and performs data abstraction and prepares de-identified case summaries. When needed, data abstraction also is done by contracted data abstractors (obstetric nurses) throughout the state.

Format of Data Presentation

De-identified case summaries are prepared and presented to the case review team. In the past, summaries were sent to team members before review meetings. However, for confidentiality reasons, case summaries are now distributed to the committee at the meeting. The state coordinator and team members read the summaries to the group before discussion.

Additional Analysis Related to MMR

New Jersey has reported an increase in maternal mortality among Hispanics. In the future, the MMR steering committee expects to expand its analyses to identify populations at high risk. The state also is using a state grant to link MMR data with other death reviews and to create a comprehensive morbidity and mortality database. This new database will include reviews of fetal, infant, child, and maternal deaths, as well as information from sudden infant death syndrome surveillance and electronic birth and death certificates.

Dissemination of Findings

Since New Jersey began its MMR program in 1932, the state has published an annual report nearly every year. When the process was based at the medical society, meeting results were published in the state medical journal and sent to hospital obstetric department chairs to disseminate to their staff. Findings also were presented at New Jersey Obstetric and Gynecology Society conferences. Currently, the committee is preparing a report of findings from 1999 through 2000. This information will be used by the state for planning purposes and to apply for block grants, as well as by consortia, hospitals, local health departments, and other local agencies for program planning.

Implementation of Findings

The case review team functions as the community action team to recommend actions based on review findings. Currently, the MMR program is working to compile 3 full years of data before making recommendations.

Technical Assistance Needs

The ability to continue networking with other states that have conducted MMR.

Key Recommendations

- A medically trained person should abstract data.
- The MMR steering committee and case review team should include key stakeholders who can help disseminate findings and recommendations.
- The MMR process should be located in the state public health agency.
- The state administration must support the process to ensure funding.
- Collaborative work with the state medical society, specifically the MCH unit, and the regional ACOG organization will provide critical initial buy-in for the MMR process.
- The MMR steering committee should identify and work with mentors who have successfully developed and implemented MMR programs in their states.

New Mexico

Program Title
New Mexico Maternal Mortality Review

Inception Date of Current Process
New Mexico has had an MMR process in some form since 1980. The current multidisciplinary committee has been in place since 1993.

Program Base
New Mexico Department of Health (NMDOH); Family Health Bureau; Maternal and Child Health Epidemiology Program

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Number of Cases Reviewed per Year: About 25–30 (at least half are pregnancy-related)

Key Accomplishments to Date
- Developed a public awareness campaign that included billboards on the two main interstates in New Mexico. These billboards encouraged women to seek early prenatal care and emphasized the importance of proper seatbelt use during pregnancy, especially the last trimester.
- Created posters that illustrate and explain the importance of proper seatbelt use during pregnancy. These posters were sent to health care practitioners and public health offices that serve women. They were accompanied by an information sheet in Spanish and English.
- Presented information related to MMR and case findings to health care practitioners at statewide obstetrics and gynecology conferences and grand rounds.
- Developed short informational alerts, which were sent to all women's health care providers in New Mexico. These alerts addressed unusual or often-missed diagnostic or treatment opportunities related to pregnancy and childbirth. They also used findings from the MMR process to make recommendations for clinical guidelines for specific conditions. Examples include the identification of risk factors, diagnosis and treatment strategies for placenta accreta, and education to improve early identification of group A streptococcus.

Staffing

The MMR committee includes two .25 FTEs: a coordinator who is an NMDOH epidemiologist and an assistant who must have some medical background and experience in dealing with issues of mortality. The Title V MCH Block Grant pays for administrative support, equipment, rent, mailings, other staffing, and meeting expenses. Members are volunteers who provide in-kind donations of their time.

Review Process Summary

New Mexico reviews deaths of women who have died within 1 year of termination of pregnancy from any cause. The state's Office of the Medical Investigator (OMI) provides the MMR staff with an electronic list of maternal deaths (approximately 6–10 per year). Vital records staff match birth and death records and send the MMR staff a list of maternal deaths and deaths of women who died within 1 year of pregnancy termination.

MMR staff obtain medical, law enforcement, and other pertinent records on each case. They assign cases to committee members for review, recruit new members, develop and maintain the MMR database for tracking and analysis, enter data for each case into the database, and schedule and set the agenda for quarterly review meetings. The committee chairperson convenes and conducts the meetings, makes state and local presentations, and provides overall leadership.

Meetings are held in Albuquerque. Cases are assigned to individual committee members for review. As part of this process, they fill out comprehensive data abstraction forms, write brief case summaries, and present their cases to the full committee at the quarterly meetings. Committee members make recommendations for preventing maternal deaths, and the MMR assistant enters the information into the database.

Review Team/Committee

Who makes up the review committee?

Committee members include obstetricians/gynecologists, perinatologists, family practice physicians, nurses, midwives, epidemiologists, social workers, health information system representatives, and pathologists. The committee also includes representation from the Indian Health Service (IHS), vital records, adolescent and family health, the OMI, private practice, the American College of Obstetricians and Gynecologists (ACOG), the Association of Women's Health, Obstetric and Neonatal Nurses (AWHONN), and the University of New Mexico's College of Nursing and School of Medicine.

How are the members selected?

By state statute, members are selected according to specific guidelines. The multidisciplinary committee must represent culturally diverse populations and may

include representatives of the following disciplines: medicine and selected subspecialties, nursing, midwifery, forensic medicine, mental health, social work, public health, epidemiology, law enforcement, the judiciary, prosecution, traffic safety, education, grief intervention and support, domestic violence, health education, and survivor or parent support groups. Membership also includes representation from federal (military and IHS), state, and local entities. Membership is voluntary, and members are not paid by the state. When members need to be replaced, or when certain case reviews require a representative from another discipline, current members make suggestions. The MMR coordinator and the committee chairperson interview and train new members.

Case Identification

The MMR staff request cases of maternal mortality from the OMI and linked birth and death data from state vital records each year. Data are submitted 2 years after a death occurred. In the future, the MMR staff plan to begin requesting mortality data quarterly and to review more current cases.

Data Reviewed

The MMR staff also ask for information from the following sources: 1) hospitals, clinics, and private physicians for prenatal, labor, and delivery records; 2) law enforcement agencies for records related to deaths that were violent or accidental; 3) behavioral health records, when pertinent; and 4) Child Fatality Review (CFR) case files (which would include child protective services and juvenile justice records) when the decedent was 24 years or younger. For homicide deaths, they request records on the perpetrator. If the case is associated with intimate partner violence, staff from the state's Intimate Partner Violence Death Review process share information. The MMR staff have been successful in obtaining most medical and law enforcement records, except those requested from the FBI and the U.S. military.

Abstraction Process

MMR committee members are assigned several cases to review each year. They review the OMI chart and the MMR case file, fill out an extensive data abstraction form, and write a brief case summary.

Data Collection or Legal Issues

- The MMR staff have not been able to obtain behavioral heath, substance use, or psychological treatment records or most school records.
- The MMR staff have drafted an agreement with the CFR staff and other agencies within the state health department that gives the MMR and CFR staffs permission to obtain records from WIC and Families First.
- The FBI and the U.S. military have been reluctant to share their records. The MMR staff asked that a representative from the FBI attend a CFR committee meeting to observe the process and understand its usefulness and strict confidentiality. This strategy usually results in the representative agreeing to serve as a liaison between the FBI and the CFR and MMR staffs.

Format of Data Presentation

Committee members present brief summaries of the cases they reviewed to the full committee. After the discussion, the committee comes to agreement on its conclusions about each case. These conclusions may include the causal relationship between the pregnancy and the death (i.e., whether the death was pregnancy-related or not pregnancy-related); the preventability of the death; and whether the committee identifies a different cause of death than the one in the vital records. The committee's findings also may identify risk factors, points of intervention, and system issues, and make recommendations for prevention or system change.

Dissemination of Findings

The MMR committee chairperson presents findings at the Wiggins Lectureship in Obstetrics and Gynecology and at the University of New Mexico Annual Women's Health Research Symposium. This information also was used to create a slide presentation that committee members can use to promote the MMR process. In addition, the committee worked with NMDOH staff to produce two billboards—one that focused on the need for early prenatal care and the other on the importance of using seatbelts during pregnancy. Committee members look for ways to disseminate information, including public awareness campaigns and health care provider alerts. These activities usually require collaboration with other state agencies or partnerships with groups such as ACOG and AWHONN.

Committee members informally share lessons learned from their reviews with other health care practitioners and plan to issue a report of their findings from the past 10 years.

Implementation of Findings

In addition to the public awareness campaign for proper seatbelt use during pregnancy, the committee also developed recommendations for clinical guidelines for diagnosis and treatment of placenta accreta and group A streptococcus.

Technical Assistance Needs

- A central clearinghouse, possibly housed at CDC, ACOG, or AMCHP, is needed to share information (including funding sources) among MMR committees.
- Mechanisms are needed to facilitate information sharing on database creation and use, abstraction forms, information-sharing agreements, dissemination and implementation of findings, data reports, and analysis.
- More channels are needed to disseminate information to policy makers such as the governor's office, the state legislature, and hospital administrators.

Key Recommendations

- Continue to promote proper seatbelt use for pregnant women through health care practitioners and public awareness campaigns.
- Continue to share clinical information on the prevention of pregnancy-related conditions with health care practitioners throughout the state.
- Emphasize confidentiality from the beginning of the MMR process.
- Consider working with other states (e.g., Arizona, Colorado, Utah) to conduct multistate reviews to increase the impact of findings.

New York

Program Title
New York State Safe Motherhood Initiative

Inception Date of Current Process
In 2003, a new noncentralized process was initiated through the District II Office of the American College of Obstetricians and Gynecologists (ACOG). Before this change, maternal mortality reviews (MMRs) were conducted in a more traditional way, using death certificates to identify cases.

Program Base
ACOG has taken the lead, with close collaboration with the New York State Department of Health (NYSDOH) and the state's Regional Perinatal Centers (RPCs).

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Number of Cases Reviewed per Year: About 10 (health officials believe that about 40 maternal deaths occur each year, but not all are being identified because reporting is voluntary).

Key Accomplishments to Date
Used maternal mortality data to update perinatal regionalization regulations to place a stronger emphasis on maternal transport and level of maternal care.

Staffing
The Safe Motherhood Initiative employs a full-time coordinator and .25 FTE clerical support at ACOG. Abstraction and case review are conducted jointly by external experts (e.g., perinatologists, other specialists), who are paid per diem, and volunteer staff members from the RPCs, who perform these duties as part of their regular jobs with no additional funding. This initiative is funded from the New York State Commissioner's Priority Pool.

Review Process Summary
The RPCs convene small ad hoc review committees whose members include medical specialists (e.g., obstetricians, obstetric nurses), representatives from ACOG District II, and RPC employees. These committees conduct data abstractions and develop case reviews as part of ongoing efforts to improve the quality of health care for women at the regional level. This information is then forwarded to a larger interdisciplinary committee, which meets annually to identify common issues and make statewide recommendations.

Review Team/Committee

RPCs conduct local MMR whenever a maternal death is reported. The ACOG District II office oversees the statewide process in collaboration with the RPCs and NYSDOH.

RPC committee members include obstetricians/gynecologists, perinatologists, nurses, and, on an as-needed basis, midwives, anesthesiologists, and other medical specialists. The statewide team includes these disciplines along with epidemiologists and public health specialists. Committee membership is part of certain job descriptions at the RPCs. Other members of the statewide committee are volunteers.

Case Identification

Hospitals notify the RPCs of any death from pregnancy-related causes that occurs during pregnancy or within 1 year of the end of a pregnancy. The goal of this direct referral is to ensure that MMR is conducted in a timely manner and that pertinent findings are relayed rapidly back to the hospital where the death occurred.

Data Reviewed

- Death certificates, hospital records, other medical records, police records, and medical examiner or autopsy reports (the latter are rarely available).
- Physician and staff interviews, including interviews with residents, attending physicians, anestheologists, interns, nursing staff members, and unit staff members working at the time of death.
- This process examines whether enough staff members were working at the time of the death, and committee members decide who to interview on the basis of an initial report.

Abstraction Process

RPC staff and ACOG reviewers abstract data.

Data Collection or Legal Issues

The confidentiality and nonpunitive focus of the New York State Safe Motherhood Initiative is protected under Public Health Law (Section 206(1)(j)). Hospitals are encouraged to report the death of any woman during pregnancy or within 1 year of the end of a pregnancy. Because the process is voluntary, only about one-fourth of the expected cases are being reported each year.

Format of Data Presentation

Case summaries.

Additional Analysis Related to MMR

No additional analyses have been conducted to date. For now, ACOG is concentrating on encouraging more hospitals to participate in the MMR process. Although state officials would like to perform additional data analyses in the future, the

current approach is designed to evaluate individual cases and give immediate feedback to hospitals and staff on how to improve health care services for pregnant women.

Because most maternal deaths in the state occur in New York City, the New York City Department of Health and Mental Hygiene is working with the Safe Motherhood Initiative to conduct retrospective reviews of maternal deaths to identify key issues. This review is drawing on both medical records and epidemiological data.

Dissemination of Findings

Findings from MMRs conducted in New York are disseminated in multiple ways. They are integrated into the RPCs' quality improvement efforts. Common issues identified during state review meetings are publicized through written reports, articles in professional journals, continuing education sessions, and satellite broadcasts focused on women's health issues. The goal is to improve health care practices statewide and to guide state policy making.

When the New York City health department identified maternal hemorrhage as a major contributor to maternal mortality, health officials sent an advisory letter to all obstetric providers in the city. A modified version of this letter was mailed to other health care providers throughout the state who provide services to women, and it was shared with the New York State Blood Council, which provides guidance to blood banks.

In addition, ACOG District II is collecting hospital-developed protocols that address obstetric hemorrhage. This information will be used to conduct a system review and remove any barriers to blood availability, resource mobilization, and medical/surgical/interventional radiology treatment.

To ensure that MMR findings are being used to improve the health of women and reduce maternal deaths, this information should be communicated regularly—to keep the process and its findings in people's minds. Regional perinatal forums have been used to publicize recommendations from case reviews, provide opportunities to link referral and tertiary medical facilities, and promote dialogue about how to address the problems identified. Composite cases are usually used for these forums because the number of maternal deaths is relatively small, and individual cases can be readily identified.

New York health officials also are planning to hold a call-to-action conference to bring stakeholders together, educate them about the importance of MMR, and solicit ideas on how to improve the process.

Implementation of Findings

During the late 1990s, New York health officials conducted a 3-year retrospective review of maternal deaths. The review concluded that pregnant women with complications were being cared for at Level 1 and 2 hospitals instead of being transported to Level 3 hospitals, which are designed for patients who need more complex care. On the basis of this review, health officials decided to update the state's perinatal

regionalization regulations to strengthen maternal care practices and change the transport policy. Over time, Level 1 hospitals accepted the need for these new procedures because they recognized that an ongoing problem existed. All state hospitals were reviewed (through surveys and random site visits), and their care levels were redesignated. This process highlighted the need to involve stakeholders from different areas, including hospital administrators, members of the clergy, insurers, and public health policy makers.

Technical Assistance Needs

- Discussions about issues related to safe motherhood should go beyond maternal mortality to include morbidity.
- New York should be a resource for other states to help them develop their own MMR processes. ACOG is an important partner in this effort.

Key Recommendations

- Reviewers involved in the MMR process need strong legal protections for their work.
- State laws or regulations should limit or prohibit the use of maternal mortality records in professional liability cases, which could make hospitals less reluctant to turn over records.

North Carolina

Program Title
North Carolina Maternal Mortality Surveillance System

Inception Date of Current Process
1942

Program Base
A cooperative agreement between the North Carolina State Center for Health Statistics (SCHS), the Division of Public Health in the North Carolina Department of Health and Human Services, and Wake Forest University.

Lead Staff
Margaret Harper, MD, MS
Medical Center Boulevard
Winston-Salem, NC 27157
Phone: (336) 716-2570; (336) 716-1025
E-mail: mharper@wfubmc.edu

Number of Cases Reviewed per Year: 50–55

Key Accomplishments to Date
- Reconstituted the maternal mortality committee to include volunteers who have enthusiastically participated in the process.
- Obtained all the information necessary to properly classify 5 years of maternal deaths.
- Determined how many pregnancy-related deaths in the past 5 years were potentially preventable.

Staffing
North Carolina's SCHS provides programming and staff for data linkages. It also provides copies of birth and death certificates as an in-kind contribution. Wake Forest donates the time of the lead staff person, and members of the MMR committee donate their own time. The process has been supported by external funding in the past; however, this funding may not continue, and the state does not have resources to continue the MMR process.

Review Process Summary
Initially, annual reviews were conducted by the lead staff person. In 2004, the state expanded the process to include a state MMR committee. The lead staff person conducts an initial review to determine if a death is pregnancy-related. She then convenes a meeting of the MMR committee to review the deaths identified as pregnancy-related. Deaths that are determined to be not pregnancy-related are not reviewed by the committee.

Review Team/Committee

- The lead staff person is a faculty member at Wake Forest University.
- Committee members include obstetricians/gynecologists, maternal fetal medicine specialists, obstetric anesthesiologists, and public health specialists. All members are volunteers.
- Members are selected from perinatal regions across the state. Six of the state's seven regions are represented on the committee at this time.

Case Identification

By permission of the state registrar, the SCHS provides copies of all death certificates with a pregnancy-related cause of death or mention of pregnancy on the death certificate. All death certificates of women aged 10–50 years that match with a live birth or fetal death which occurred in the previous year also are provided. The statewide hospital discharge database identifies cases with a pregnancy-related diagnosis or CPT code and "deceased" status at discharge.

Data Reviewed

Data are abstracted from death certificates and autopsy reports (23 of 38 cases had autopsy reports in 2001). If the information is not complete, hospital discharge information and death summaries are reviewed. The lead staff person maintains all data files, conducts the initial review, and requests records on an as-needed basis. The SCHS provides staff support for data linkage.

Abstraction Process

The lead staff person collects, abstracts, and summarizes the data for each case.

Data Collection or Legal Issues

- Information from military hospitals is difficult to obtain, even though a significant number of maternal deaths occur there.
- No state law allows the MMR committee to access maternal mortality records.

Format of Data Presentation

De-identified clinical summaries.

Additional Analysis Related to MMR

State health officials are analyzing MMR data (with the help of a consultant) to examine the preventability of pregnancy-related deaths in the state and to obtain better population-based estimates of the true incidence of peripartum cardiomyopathy. They also are working to identify factors that explain the racial disparity in pregnancy-related mortality.

Dissemination of Findings

Data are disseminated through an annual report that summarizes the number and causes of maternal deaths. This report is distributed through the Division of Public Health and the SCHS and made available to medical societies, including the Obstetrics and Gynecology Society. MMR findings are presented during perinatal/neonatal annual meetings, and aggregate data (covering 3 years) have been presented to the state medical society committee.

In addition, summary reports of the findings have been published in the North Carolina Medical Journal. Some findings also have been reported in peer-reviewed national journals (e.g., *Annals of Epidemiology, American Journal of Obstetrics* and *Gynecology, Obstetrics and Gynecology*), including a recent article highlighting the increased risk of pregnancy-related death associated with lack of prenatal care and cesarean delivery.

Implementation of Findings

Through the MMR process, health officials have identified peripartum cardiomyopathy as a leading cause of death for pregnant women in North Carolina. In response, they have developed an educational program to address this problem.

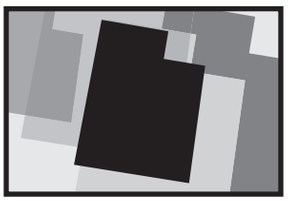
MMR findings also indicate that the state must strengthen its regionalization policies on when women should be transported to hospitals with higher-level services. In addition, North Carolina must do more to promote preconception care to consumers and health care providers. Translating MMR findings into action has been difficult so far because the MMR committee includes academic medical professionals but no policy makers.

Technical Assistance Needs

The MMR process should expand to include state policy makers.

Key Recommendations

- Hospitals should conduct mock drills of possible emergency situations to identify and practice the roles of different staff members (i.e., who will get blood, who will care for the mother, who will care for the neonate, who will notify whom, who will call for support). The goal is to ensure that procedures go as smoothly as possible during a real emergency.
- The MMR committee should include representatives from across the state.
- Committee members should have firsthand knowledge and expertise in maternal mortality and morbidity.
- Committee members should include leaders in academic medicine throughout the state (i.e., in perinatal centers).



Utah

Program Title
Perinatal Mortality Review (PMR)

Inception Date of Current Process
This program began in 1995 with a retrospective review of maternal deaths in Utah during 1982–1994. Annual reviews have been conducted since that time.

Program Base
Utah Department of Health (UDOH); Maternal and Child Health Bureau; Reproductive Health Program

Lead Staff
Lois Bloebaum
Utah Department of Health, Reproductive Health Program
PO Box 142001
Salt Lake City, UT 84114-2001
Phone: (801) 538-6792; Fax: (801) 538-9409
E-mail: lbloebaum@utah.gov

Number of Cases Reviewed per Year: 5–9

Key Accomplishments to Date
- Working to amend the state code to include a focus on women's health. A review of the code found that it addressed perinatal services but did not include maternal health.
- Helping to raise awareness of maternal mortality and perinatal mental health issues.

Staffing
Staffing for Utah's PMR program includes a program director, 0.1 FTE; a program coordinator, 0.8 FTE; and clerical support, 0.25 FTE. The program is funded solely through the Title V MCH Block Grant. Expenses include staffing and operational costs, such as communication services, postage and mailing, building rental/maintenance, office supplies, printing, photocopying, data processing hardware/software/network, employee travel and development, and meals for committee members.

Review Process Summary
The PMR program coordinator works closely with members of the PMR committee to review maternal deaths in the state. The program also reviews infant deaths due to perinatal conditions and fetal deaths of 35 weeks' gestation or more. The committee meets 12 times each year to review maternal, fetal, and infant deaths. This approach gives the committee a broad picture of perinatal health.

The PMR committee includes obstetricians and pediatricians, labor and delivery nurses, and neonatal intensive care unit nurses. The committee reviews medical charts for each case and then presents its findings. Chart reviews offer an opportunity to identify morbidities and additional risk factors.

Review Team/Committee

Who convenes the process?
PMR program staff.

Who makes up the review committee?
Disciplines represented include perinatalogy, obstetrics, neonatology, pediatrics, midwifery, nursing, and public health.

How are members selected?
Reviewers are volunteers (the same team conducts fetal and infant mortality reviews). For the initial selection of committee members, the PMR program staff developed a policy paper on the topic of maternal mortality. They used this paper to solicit participation by key perinatal health care providers at academic institutions in Utah. Over time, committee members have helped to identify and recruit other volunteers when they leave the committee.

Case Identification

Each year, the PMR program coordinator asks UDOH Bureau of Vital Records staff to link the deaths of all women of reproductive age with live births (when delivery occurred within 1 year of the mother's death) and fetal deaths in the state. Matched cases are then screened by the coordinator and the perinatologist to select those that meet the review criteria.

Data Reviewed

Death certificates, birth certificates, fetal death certificates, hospital records, medical records, medical examiner reports, autopsy reports, selected expert consultants, and police reports when applicable.

Abstraction Process

The PMR program coordinator abstracts and summarizes the cases, and then presents them to the entire committee for review.

Format of Data Presentation

Written case summaries are developed by the PMR program coordinator. Summaries are de-identified and distributed to committee members before review meetings.

Additional Analysis Related to MMR

See dissemination activities outlined in the next section.

Dissemination of Findings

In 1995, the PMR program conducted a retrospective 13-year review of all maternal deaths reported in Utah during 1982–1994 (published in *Obstetrics and Gynecology* 1998;91:187–191). This review identified a maternal mortality ratio of 12.8 deaths per 100,000 live births. This ratio was sharply higher than those reported in previous years because health officials changed the definition of maternal mortality and improved the case-finding process.

The review also identified pulmonary embolism as the most common cause of direct obstetric death in Utah. In addition, it documented higher maternal mortality rates among older women and women with higher parity.

State health officials also developed a fact sheet that presented information about causes of death, age-specific death rates, and parity-specific death rates during 1995–2002.

Implementation of Findings

The UDOH uses MMR findings for program planning. In addition, a recent partnership with the UDOH's Patient Safety Committee will provide a way to send feedback to health care facilities when a case review identifies medical errors in a particular case.

The state Reproductive Health Program (RHP) also has used many of the recommendations made by the PMR committee to develop educational strategies for the general public and health care providers. For example, a review of maternal deaths due to suicide related to postpartum depression spurred the RHP to implement training for prenatal health care providers on how to screen for and treat depression during pregnancy. The program also has published educational materials on postpartum depression for pregnant women.

Technical Assistance Needs

- PMR committee members would like to expand their ability to identify maternal deaths in which the pregnancy did not result in a live birth or fetal death by linking death certificates with hospital discharge data.
- Committee members also plan to begin identifying and reviewing "near miss" cases with severe morbidities that do not result in death. Reviewing severe morbidities—such as those that require a pregnant woman to be admitted to an intensive care unit—and identifying the related risk factors may help bring more attention to perinatal health issues.
- National leadership is needed to facilitate meetings among states to help them work together on maternal mortality issues.

Key Recommendations

- Educate health care providers in Utah about ways to prevent deaths from embolism and preeclampsia/eclampsia, which have been identified as the leading causes of maternal mortality in recent years. Sample recommendations have been made, including induction of labor when appropriate, prompt use of antihypertensive medications, close monitoring of blood platelet values, and continuation of magnesium sulfate for 24 hours after delivery.
- Use a life cycle approach to help generate more partnerships and funding.
- Develop performance measures to keep the issue of maternal mortality and perinatal health on policy makers' radar screen.
- Place operational control of the MMR process in a relevant program area to increase capacity to implement regulatory change and disseminate findings more effectively. For example, basing the PMR committee in the state department of health provides access to medical records for public health purposes.
- Access available technical assistance from CDC for program and data development.
- Develop strong partnerships with university research departments of perinatology/obstretrics.

Virginia

Program Title
Virginia Maternal Mortality Review (MMR) Group

Inception Date of Current Process
March 2002

Program Base
Cooperative effort between the Office of the Chief Medical Examiner and the Office of Family Health Services, both of which are part of the Virginia Department of Health (VDH).

Lead Staff
Molly B. Massey, RN, BSN
Office of the Chief Medical Examiner
400 East Jackson Street
Richmond, VA 23219
Phone: (804) 786-6095

Number of Cases Reviewed per Year: About 40–45

Key Accomplishments to Date
- Established a multidisciplinary review committee.
- Developed a written protocol outlining the committee's policies and procedures.
- Completed multidisciplinary reviews of Virginia's maternal deaths during 1999–2001.
- Developed a preliminary report on the findings of the 1999–2001 review and published it in 2005.
- Identified the use of community action teams as an effective way to perform reviews at the grassroots level. These teams are already used as part of the state's Fetal and Infant Mortality Review process.

Staffing
Program staff include a coordinator who also abstracts cases. Data access is under the authority of the state commissioner of health and the Code of Virginia. Funding comes from the Title V MCH Block Grant.

Review Process Summary
The Virginia MMR Group meets in the state medical examiner's office about six times a year.

Review Team/Committee

Who convenes the process?
The MMR coordinator.

Who makes up the review committee?
The MMR Group is composed of representatives from the Virginia chapters of the American College of Obstetricians and Gynecologists (ACOG); the Association of Women's Health, Obstetric and Neonatal Nurses; the American College of Nurse Midwives; and the National Association of Social Workers.

It also includes representatives from the Medical Society of Virginia, the Virginia Sexual and Domestic Violence Action Alliance, the Virginia Hospital and Healthcare Association, the VDH, the Center for Health Statistics, local health departments, and the Virginia Perinatal Association.

The committee is both diverse and multidisciplinary, and it includes physicians, nurses, nurse practitioners, certified nurse midwives, social workers, medical examiners, psychologists, and statisticians. Members come from across the state and from organizations representing vital statistics, family health services, women's health, social work organizations, regional perinatal centers, domestic violence, hospital associations, and the state perinatal association. Clinicians who represent their clinical societies are invited to participate by the Office of the Chief Medical Examiner.

How are members selected?
Members of the review group are volunteers who represent their individual agencies or associations.

Case Identification

The MMR Group reviews all deaths occurring during or within 1 year of the termination of a pregnancy, regardless of outcome or the cause of death. Cases are identified using *International Classification of Diseases* codes, linked birth and death data, and the checkbox information from the mother's death certificate.

Data Reviewed

Data reviewed include death certificates, birth certificates, medical examiner records, autopsy reports, and medical records (including prenatal, hospital, transport, emergency care, primary care, and specialists' consultation records). Virginia uses a modified version of Florida's abstraction tools to abstract data from the medical records that have been made available to the medical examiner's office.

Abstraction Process

The MMR coordinator collects the appropriate records, abtracts the data, and prepares case summaries for committee review.

Format of Data Presentation
De-identified data are presented through completed abstraction forms and corresponding case summaries at each review meeting.

Dissemination of Findings
Formal reports are prepared and distributed to state lawmakers and other stakeholders with an interest in maternal health. Findings also are posted on the VDH Web site and presented at conferences and meetings of interested groups.

The MMR coordinator prepares presentation materials to support committee members' efforts to educate their colleagues about maternal deaths and the committee's recommendations. When possible, the coordinator also attends presentations made by committee members.

Implementation of Findings
Committee members are encouraged to present findings to their partners and to implement changes in their agencies and organizations.

Technical Assistance Needs
- Virginia health officials would like to work more with other states to coordinate development of abstraction tools, databases, reports, and recommendations.
- Health officials also are interested in the development of a standard set of MMR variables that all states can use and modify according to their own interests and needs.
- The review committee should expand to include more diversity and range of disciplines.

Key Recommendations
- The goals and objectives of the MMR process should be measured to justify the process and demonstrate how it can reduce maternal deaths.
- The cost efficiencies of the process should be highlighted.
- States that want to develop an MMR process will need help to understand what statutory protections are necessary, what the current laws in their state are, whether and how these laws need to be changed, what section of state code should incorporate any new protections, and who will write the new regulations. ACOG can provide valuable technical assistance for this process.

Appendix A

Professions and Disciplines Represented on Maternal Mortality Review Committees, by State*

* Information based on participants at the 2003 Invitational Meeting on State Maternal Mortality Review.

	Florida	Massachusetts	Michigan Medical Review Committee	Michigan Injury Review Committee	New Jersey	New Mexico	New York Regional Perinatal Committees	New York Statewide Committee	North Carolina	Utah	Virginia
Obstetrician	X	X	X	X	X	X	X	X	X	X	X
Perinatologist	X	X	X	X	X	X	X	X	X	X	
Midwife/Nurse Practitioner	X	X	X	X	X	X		X		X	X
Pathologist	X	X	X	X	X	X					
Medical Examiner		X			X						X
Family Practice Physician		X				X					
Family Planning Provider					X						
Intensivist		X			X						
Anesthesiology		X	X		X		X	X			
Social Work	X		X		X	X					X
Mental Health Counselor					X						
Epidemiology	X	X	X	X		X		X			X
Nursing	X	X	X	X	X	X	X	X			X
Nutritionist					X	X					
Paramedic					X	X					
Risk Management					X	X					
Hospital Administration					X	X					
Neonatology	X	X				X				X	
Pediatrics	X									X	
Public Health Specialist/Physician		X			X	X		X		X	
State Health Department	X	X	X	X	X	X			X	X	X
Community Maternal and Child Health or Minority Advocate	X				X						
University/Academic Institute			X	X		X			X		
Local Health Department	X					X					
Medicaid	X	X									
Police				X		X					
Clergy					X						
Judge				X							

Appendix B

Sample Maternal Mortality Review Memorandum of Agreement*

*Adapted with permission from the New Mexico Maternal Mortality Review Committee.

Between
[Insert your state and agency]

And
[Insert partner agency]

This Memorandum of Agreement (Agreement) is entered into between the **[Insert your state and agency]** and **[Insert partner agency]**.

I. Purpose

The purpose of this Agreement is to outline a process to share confidential case information from the **[Insert partner agency]** to the **[Insert your state and agency]** Maternal Mortality Review (MMR) staff. The parties agree that this information is to be used exclusively for the purpose of analyzing maternal mortality causes and trends. Information from the MMR process is vital to the development of statewide prevention strategies. This information will be collected under the protocols devised by the **[Insert your state and agency]** in accordance with state statutes and privacy regulations.

II. Terms of Agreement

[Insert your state and agency] agrees to:

1. Provide an annual list of deceased women from the MMR files to the **[Insert partner agency]** to determine if any of the cases have been in the **[Insert partner agency]** system.
2. Use the case information only to analyze maternal mortality causes and trends and to identify risk reduction and system improvement factors.
3. Acknowledge **[Insert partner agency]**'s participation in the MMR process in the MMR annual report.
4. Collect information in accordance with the protocols devised by the **[Insert your state and agency]** that are intended to shield from public disclosure the names and identities of any woman involved in the **[Insert partner agency]** system.
5. Make no assessment concerning any decisions or exercise of professional judgment concerning any acts or omissions related to employees of the **[Insert partner agency]**.
6. Eliminate from MMR reports any identifying information or information that could lead to the identity of a woman or her family.
7. Have all participants in the MMR process sign a confidentiality agreement that specifically warns any participant of the consequences of releasing information contained in **[Insert partner agency]** records for any purposes, including the penalty specified in **[Insert your state's relevant regulations]**.

[Insert partner agency] agrees to:

1. Provide the MMR staff with hard copies of or access to case files whenever possible.
2. Assign representatives from the **[Insert partner agency]** and from each relevant division, including **[Insert relevant partner divisions],** to serve as contacts for the MMR staff.
3. Assign representatives to research the list of cases identified by the MMR staff in relevant databases (e.g., **[List or give examples]**) to identify cases in the **[Insert partner agency]** system.

4. Send a representative to MMR case review meetings as a panel participant, upon request of the MMR coordinator.

III. Administering Agency
The administering agency is the **[Insert your state and agency]**.

IV. Confidentiality
The Privacy Rule of the Health Insurance Portability and Accountability Act of 1996 (HIPAA) allows a covered entity to disclose protected health information without individual authorization as required by law 1) to a public health authority for public health activities authorized by law and 2) to a health oversight agency for oversight activities authorized by law [45 CFR Section 164.512 (a), (b) and (d)].

Both parties understand that the records of the **[Insert partner agency]** are confidential and may not be released to the public, unless a court order is produced. A subpoena is not a court order for the purposes of this Agreement.

Both parties understand the confidentiality requirements governing this Agreement and agree to protect the release of any information from any and all individual case information exchanged under the terms of this Agreement. Both parties further agree not to reproduce or disclose any individual case information in any form to any third party, unless required to do so by a valid court order.

Both parties agree to notify the other immediately should disclosure of confidential information become subject to court order. Should any individual case information become subject to any inquiry, subpoena, discovery request, or request under the Inspection of Public Records Act, both parties agree to immediately refer the inquiry or request to their respective Office of General Counsel.

All documents in possession of the MMR staff are kept secure. All files are stored in locked file cabinets, in a locked office, in a locked and secure building. Case file documentation will be shredded when all data are entered into the secure MMR database.

V. Property
Both parties understand and agree that hard copies of case files provided by the **[Insert partner agency]** and acquired as a result of this Agreement shall be the property of the **[Insert partner agency]**. Data collected and entered into the MMR database shall be the sole property of the **[Insert your state and agency]**.

VI. Termination of Agreement
This Agreement may be terminated by either party upon written notice delivered to the other party at least 30 days prior to the intended date of termination.

VII. Liability
Neither party shall be responsible for liability incurred as the result of the other party's acts or omissions in connection with this Agreement. Any liability incurred in connection with the Agreement is subject to the immunities and limitations of the **[Insert your state's relevant regulations]**.

VIII. Period of Agreement

This Agreement shall become effective upon approval by both parties and shall remain in effect until **[Insert Agreement expiration date]**, unless terminated pursuant to paragraph

VI. Any and all amendments shall be made in writing and shall be agreed to and executed by the respective agency directors before becoming effective.

By _____ Date_____
[Insert name]
Director
_____
[Insert your state and agency]

By _____ Date_____
[Insert name]
Director
_____
[Insert partner agency]

By _____ Date_____
[Insert name]
Office of General Counsel
_____
[Insert your state and agency]

By _____ Date_____
[Insert name]
Office of General Counsel
_____
[Insert partner agency]

Appendix C

Sample Maternal Mortality Review Records Request Form*

* Adapted with permission from the New Mexico Maternal Mortality Review Committee.

Pursuant to the legal authority of the **[Insert your state's relevant regulations]**, the **[Insert your state] Maternal Mortality Review Committee** requests records of each maternal fatality for the purpose of collecting data and information to identify prevention, risk reduction, and system improvement factors.

The **[Insert your state health department name]** is a covered entity and public health authority as delineated in the federal Health Insurance Portability and Accountability Act (HIPAA) of 1996 and its Privacy Rule. Federal law allows a covered entity to disclose protected health information without individual authorization as required by law 1) to a public health authority for public health activities authorized by law and 2) to a health oversight agency for oversight activities authorized by law [45 CFR Section 164.512 (a), (b) and (d)].

A maternal fatality includes each death of a **[Insert your state]** resident woman or a **[Insert your state]** occurrence of death to a nonresident woman who, at the time of death, was pregnant or had terminated a pregnancy within 12 months of her death and whose manner and cause of death was pregnancy-related or pregnancy-associated. The MMR Committee aggregates these data to create reports on state maternal fatalities. Strict confidentiality and privacy for decedents, decedent families, and health care providers is ensured. Identifiers for the case to be reviewed are provided below. Your prompt reply to this request is appreciated.

[Insert name/signature and title]

To: Records	**In the Matter of:** Name: Address: Date of Birth: Date of Death: Next of kin: Relationship:

Please provide the following documentation:
Medical records up to and including health care received in relation to a woman's prenatal, labor and delivery, and postpartum care for the most recent pregnancy. For your convenience, a self-addressed label is enclosed to ensure delivery and confidential handling. If you have any questions, please contact the MMR Coordinator, **[Insert name and contact information]**.

Appendix D

Sample Maternal Mortality Review Case Abstraction Form (New York State)*

* Used with permission from the New York Safe Motherhood Initiative.

STATE OF NEW YORK
DEPARTMENT OF HEALTH

Maternal Death Abstraction Form

Safe Motherhood

New York State Safe Motherhood Initiative

ACOG District II/NY
152 Washington Avenue
Albany, NY 12210

GENERAL INSTRUCTIONS

- Items should not be left blank, unless otherwise indicated.
- For item coding questions refer to the instruction manual.
- Skip the prenatal hospitalization section (questions 37-42) if the mother had no prenatal hospitalizations, excluding the admission ending in delivery.

Use the bottom of each page for additional writing space and specify item number.

CONFIDENTIAL

IDENTIFYING INFORMATION	
1. Case registry number*_____	
2. Date of death*_____/_____/_____	3. Time of death* _____
4. Was pregnancy checked on the death certificate?* 0. No 1. Yes 8. Death certificate unavailable 9. Unknown	5. Cause of death as stated on the death certificate _____ *(Code 88=death certificate unavailable)*

CONFIDENTIAL

DEMOGRAPHIC INFORMATION
(Circle the one that applies, unless otherwise indicated.)

6. Mother's date of birth* _____/_____/_____

7. Mother's place of birth* _____
   a. Enter year entered the U.S., if known* _____
   (777=Not applicable, 999=unknown)

8. Zip code of residence* _____
   (8=Data unavailable, 9=Unknown)

9. Mother's religion _____
   (8=Data unavailable, 9=Unknown)

10. Race (*circle all that apply*) *
    1. White/Caucasian
    2. Black or African American
    3. Asian Indian
    4. Chinese
    5. Filipino
    6. Japanese
    7. Korean
    8. Vietnamese
    9. Native Hawaiian
    10. Guamanian or Chamorro
    11. Samoan
    12. American Indian or Alaska Native (*specify tribe*) _____
    13. Other Asian (*specify*) _____
    14. Other Pacific Islander (*specify*) _____
    15. Other (*specify*)_____
    99. Unknown

11. Marital status *(circle all that apply)*
    1. Single
    2. Married
    3. Living with domestic partner
    4. Separated
    5. Divorced
    6. Widowed
    9. Unknown

12. Was English the mother's primary language?
    0. No
    1. Yes
    8. Data unavailable
    9. Unknown

13. Mother' s occupation *(specify)*
    _____

14. Was the mother employed anytime during the index pregnancy?
    0. No
    1. Yes
    9. Unknown

15. Educational level*
    1. 8th grade or less
    2. 9th – 12th grade, no diploma
    3. High school graduate or GED
    4. Some college credit, but no degree*
    5. Associate's degree
    6. Bachelor's degree
    7. Master's degree
    8. Doctorate/professional degree
    9. Unknown

16. Type of financial coverage/medical insurance*
    (circle all that apply)
    1. Medicaid (Child Health Plus A, PCAP, MOMS)
    2. Managed care
    3. Private insurance
    4. Indian health service
    5. CHAMPUS, TRICARE
    6. Family health plus/Child health plus B
    7. Self pay or none
    8. Other *(specify)*_____
    9. Unknown

    a. Primary payer *(specify)**_____

PAST PREGNANCIES

17. Parity #* _____/_____/_____/_____
Full tem / Premature/ Abortion / Live Children

18. *(Include the most recent six pregnancies, abortions and ectopic pregnancies, code 88=Data unavailable and 99=Unknown)**

Year	Weeks gestation	Method of delivery	Type of TOP	Location of delivery *(if known)*	Pregnancy outcome	Maternal complications *(if any)*	Infant complications *(if any)*
1.							
2.							
3.							
4.							
5.							
6.							

PRENATAL- MEDICAL HISTORY

(Circle the one that applies, unless otherwise indicated.)

19. Indicate source of prenatal information *(circle all that apply)**
    0. No information on woman's prenatal care
    1. Prenatal care record
    2. Prenatal care summary sheet
    3. Admission history
    4. Other *(specify)*

    _____

20. Prenatal care source *(circle all that apply)**
    0. None
    1. Health department clinic
    2. Hospital clinic
    3. Neighborhood health center
    4. High risk clinic
    5. Private office
    8. Data unavailable
    9. Unknown

    a. Did the mother receive high-risk *referral(s) (from a high-risk clinic, MFM specialist or tertiary care)*?
        0. No (skip to question 21)
        1. Yes *(specify)*
        8. Data unavailable
        9. Unknown

    b. Did the mother receive high-risk *care* as a result of the referral(s)?
        0. No
        1. Yes *(specify)*
        8. Data unavailable
        9. Unknown

21. Indicate any relevant past obstetric and/or medical history prior to the index pregnancy?*

22. Was the index pregnancy intended?
    0. No
    1. Yes
    8. Data unavailable
    9. Unknown

23. Was the index pregnancy wanted?
    0. No
    1. Yes
    8. Data unavailable
    9. Unknown

24. Did the woman use artificial reproductive technologies for the index pregnancy?
    0. No
    1. Yes *(specify type)* _____
    8. Data unavailable
    9. Unknown

Index pregnancy

25. Gestation at first prenatal visit *_____
    If she initiated prenatal care after 20 weeks, describe.

26. Weight and height recorded at initial prenatal visits*
    _____ht _____wt

27. Final EDD* _____/_____/_____
    a. Was the final EDD confirmed by sonogram?
        0. No
        1. Yes
        8. Data unavailable
        9. Unknown

28. No. of prenatal visits* _____

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PRENATAL-MEDICAL HISTORY

Prenatal medication list

29. Concurrent prescribed and OTC medications dietary supplements and herbs used during pregnancy*

Drug	Indication	Comments
1.		
2.		
3.		
4.		
5.		
6.		
7.		

Substance use

30. Smoked during pregnancy _____
(0=No, 1=Yes, 8= Data unavailable, 9=Unknown)
If yes then:
a. Number of cigarettes smoked per day _____

31. Alcohol use during pregnancy*____
(0=No, 1=Yes, 8= Data unavailable, 9=Unknown)
If yes then:
a. Type of alcohol _____
(8= Data unavailable, 9=Unknown)
b. Frequency of alcohol use per week ____
(88= Data unavailable, 99=Unknown)

32. Illicit drug use during pregnancy* ____
(0=No, 1=Yes, 8= Data unavailable, 9=Unknown)
a. Frequency of drug used per day _____
(88= Data unavailable, 99=Unknown)
b. Dependency to drug(s) _____
(0=No, 1=Yes, 8=Data unavailable, 9=Unknown)

33. Specify drug(s)*
(circle all that apply and specify amount used per day)
1. Barbiturates _____
2. Cocaine _____
3. Ecstasy _____
4. Heroin _____
5. Inhalants _____
6. LSD _____
7. Marijuana _____
8. Methadone _____
9. Methamphetamine _____
10. PCP _____
11. Other _____
88. Data unavailable
99. Unknown

34. Laboratory screening tests

Prenatal labs	Done *0=No, 1=Yes, 8= Data unavailable, 9=Unknown*	Abnormal results *(specify date and results)*	*Comments*
1. Blood type	*0. 1. 8. 9.*		
2. D (Rh) type	*0. 1. 8. 9.*		
3. Antibody screen	*0. 1. 8. 9.*		
4. HCT/HGB	*0. 1. 8. 9.*		
5. Urine culture/screen	*0. 1. 8. 9.*		
6. HbsAG	*0. 1. 8. 9.*		
7. HIV testing	*0. 1. 8. 9.*		
8. PPD	*0. 1. 8. 9.*		
9. Chlamydia	*0. 1. 9. 9.*		
10. Gonorrhea	*0. 1. 8. 9.*		
11. Syphilis screen	*0. 1. 8. 9.*		
12. Glucose challenge test	*0. 1. 8. 9.*		
13. Group B strep	*0. 1. 8. 9.*		
14. Other *(specify; e.g., Alpha feto protein, karyotype)*			

PRENATAL- MEDICAL HISTORY

(Circle all that apply, unless otherwise indicated.)

35. Was the mother at*
    0. Low risk
    1. Risk
    2. High risk
    3. Very high risk

a. Was the baby at*
    0. Low risk
    1. Risk
    2. High risk
    3. Very high risk

36. **Provider identified risk factors**
*(Circle all that apply)**

0=No, 1=Yes, 8= Data unavailable, 9=Unknown

Factor ***For each identified risk factor, answer columns a-c.***	***a. Was the risk factor identified on the medical record?***				***b. Did the provider act on the patient's risk?***				***c. Was the patient managed properly?***			
0. None												
1. AIDS/HIV +	*0.*	*1.*	*8.*	*9.*	*0.*	*1.*	*8.*	*9.*	*0.*	*1.*	*8.*	*9.*
2. Anemia Hgb*	*0.*	*1.*	*8.*	*9.*	*0.*	*1.*	*8.*	*9.*	*0.*	*1.*	*8.*	*9.*
3. Cardiac I or II	*0.*	*1.*	*8.*	*9.*	*0.*	*1.*	*8.*	*9.*	*0.*	*1.*	*8.*	*9.*
4. Cardiac III or IV	*0.*	*1.*	*9.*	*9.*	*0.*	*1.*	*9.*	*9.*	*0.*	*1.*	*9.*	*9.*
5. Epilepsy	*0.*	*1.*	*8.*	*9.*	*0.*	*1.*	*8.*	*9.*	*0.*	*1.*	*8.*	*9.*
6. Homeless	*0.*	*1.*	*8.*	*9.*	*0.*	*1.*	*8.*	*9.*	*0.*	*1.*	*8.*	*9.*
7. History of embolism	*0.*	*1.*	*8.*	*9.*	*0.*	*1.*	*8.*	*9.*	*0.*	*1.*	*8.*	*9.*
8. History of drug addiction	*0.*	*1.*	*9.*	*9.*	*0.*	*1.*	*9.*	*9.*	*0.*	*1.*	*9.*	*9.*
9. Hypertension*	*0.*	*1.*	*8.*	*9.*	*0.*	*1.*	*8.*	*9.*	*0.*	*1.*	*8.*	*9.*
10. Pregestational diabetes	*0.*	*1.*	*8.*	*9.*	*0.*	*1.*	*8.*	*9.*	*0.*	*1.*	*8.*	*9.*
11. Renal disease *(chronic)*	*0.*	*1.*	*8.*	*9.*	*0.*	*1.*	*8.*	*9.*	*0.*	*1.*	*8.*	*9.*
12. Uterine abnormality or incompetent cervix	*0.*	*1.*	*8.*	*9.*	*0.*	*1.*	*8.*	*9.*	*0.*	*1.*	*8.*	*9.*
13. Obesity	*0.*	*1.*	*8.*	*9.*	*0.*	*1.*	*8.*	*9.*	*0.*	*1.*	*8.*	*9.*
14. Other(s) *(specify)*	*1.*	*2.*	*10.*	*11.*	*2.*	*3.*	*9.*	*10.*	*2.*	*3.*	*10.*	*11.*

PRENATAL HOSPITALIZATIONS

NOTE: SKIP THIS SECTION IF THE MOTHER HAD NO PRENATAL HOSPITALIZATIONS, EXCLUDING THE ADMISSION ENDING IN DELIVERY.

*COMPLETE FOR EACH PRENATAL HOSPITALIZATION.**

 # 1 Hospitalization

37a. Level of hospital* 1. Level 1 2. Level 2 3. Level 3 4. Regional Perinatal Center/Level 4	38a. Date of admission* _____/_____/_____
39a. Time of admission* _____	40a. Admission diagnosis/condition*

41a. Describe medical or surgical problems developed or exacerbated during hospitalization

Medical problems	***Comments*** *(specify problem, date/time and treatment)*

42a. Was the patient transferred to a higher level of care, due to complications or possible complications during the hospitalization?*

0. No
1. Yes *(describe and specify the level of hospital transferred to)*

 # 2 Hospitalization

37b. Level of hospital* 1. Level 1 2. Level 2 3. Level 3 4. Regional Perinatal Center/Level 4	38b. Date of admission* _____/_____/_____
39b. Time of admission* _____	40b. Admission diagnosis/condition*

41b. Describe medical or surgical problems developed or exacerbated during hospitalization

Medical problems	***Comments*** *(specify problem, date/time and treatment)*

42b. Was the patient transferred to a higher level of care, due to complications or possible complications during the hospitalization?*

0. No
1. Yes *(describe and specify the level of hospital transferred to)*

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# 3 Hospitalization	
37c. Level of hospital* 1. Level 1 2. Level 2 3. Level 3 4. Regional Perinatal Center/Level 4	38c. Date of admission* _____/_____/_____
39c. Time of admission* _____	40c. Admission diagnosis/condition*
41c. Describe medical or surgical problems developed or exacerbated during hospitalization	
Medical problems	***Comments*** *(specify problem, date/time and treatment)*
42c. Was the patient transferred to a higher level of care, due to complications or possible complications during the hospitalization?* 0. No 1. Yes *(describe and specify the level of hospital transferred to)*	

# 4 Hospitalization	
37d. Level of hospital* 1. Level 1 2. Level 2 3. Level 3 4. Regional Perinatal Center/Level 4	38d. Date of admission* _____/_____/_____
39d. Time of admission* _____	40d. Admission diagnosis/condition*
41d. Describe medical or surgical problems developed or exacerbated during hospitalization	
Medical problems	***Comments*** *(specify problem, date/time and treatment)*
42d. Was the patient transferred to a higher level of care, due to complications or possible complications during the hospitalization?* 0. No 1. Yes *(describe and specify the level of hospital transferred to)*	

INTRAPARTUM-MEDICAL HISTORY

(Circle the one that applies, unless otherwise indicated.)

Admission

43. Place of delivery*
    1. Level 1 hospital
    2. Level 2 hospital
    3. Level 3 hospital
    4. Regional Perinatal Center/Level 4 hospital
    5. Birthing center
    6. At home
    7. Other *(specify)*_____

44. Date of admission* _____/_____/_____

45. Time of admission* _____

46. Weeks gestation at delivery* _____

47. Height* _____

48. Weight recorded prior to delivery* _____

INTRAPARTUM-MEDICAL HISTORY

(Circle the one that applies, unless otherwise indicated.)

49. Describe admission diagnosis and course of labor *(Include vital signs, BP, reflexes, urine, etc.)*

Obstetric complications during L & D

50. Obstetric complications *(circle all that apply)**
    0. None
    1. Preeclampsia
    2. Hemorrhage*
    3. Chorioamnionitis
    4. Amniotic fluid embolism
    5. Anesthesia complication
    6. Uterine rupture
    7. Eclampsia
    8. HELLP syndrome*
    9. Other *(specify and describe)*

51. Placental complications *(circle all that apply)**
    0. None
    1. Abruptio
    2. Retained placenta
    3. Previa
    4. Manual removal of placenta
    5. Percreta, increta or accreta
    6. Other *(specify and describe)*

Anesthesia/medications

52. Type of anesthesia for L & D*
    (circle all that apply)
    0. None
    1. Local
    2. Epidural
    3. Spinal
    4. CSE*
    5. General *(specify)* _____
    6. Other combined *(specify)* _____
    7. MAC*
    8. Other *(specify)* _____
    9. Unknown

53. Describe any complications developed during anesthesia

54. Was blood transfusion or blood product(s) indicated any time during prenatal hospitalization(s) or intrapartum care?
    0. No
    1. Yes (go to section a) *specify, prenatal or intrapartum* _____
    9. Unknown

a. Was transfusion or blood product(s) *(circle all that apply)*
    1. Refused
    2. Delayed
    3. Administered

55. List significant medications (e.g., tocolytics, pitocin, prostaglandins and analgesia, etc.), IV fluid(s) etc., used during L & D.

1.
2.
3.
4.
5.
6.
7.
8.
9.
10.

INTRAPARTUM-MEDICAL HISTORY

(Circle the one that applies, unless otherwise indicated.)

Pregnancy outcome

56. Type of L & D provider *(circle all that apply)**

(Information obtained from hospital's physician credential records.)

1. Obstetrician *(board certified)*
2. Obstetrician *(trained not certified)*
3. MFM specialist
4. Family practitioner
5. Licensed midwife
6. Resident *(specify type and level of training)*

   _____
7. Other *(specify)*_____

INTRAPARTUM-MEDICAL HISTORY

(Circle the one that applies, unless otherwise indicated.)

57. Pregnancy outcome *(index pregnancy, circle all that apply)**
    0. Undelivered
    1. Live delivery: singleton
    2. Live delivery: multi fetal gestation
    3. Stillborn(s)
    4. Spontaneous abortion
    5. Ectopic
    6. Trophoblastic/molar
    7. Other *(specify)* _____
    9. Unknown

58. Describe newborn's status and time of birth*

59. Type of delivery*
    0. Undelivered (skip to question 69)
    1. NSVD*
    2. Operative vaginal delivery *(specify)*_____
    3. VBAC*
    4. Attempted VBAC/c-section
    6. C-Section: Elective/scheduled
    7. C-Section: Unscheduled non-emergent*
    8. C-Section: Emergent*
    9. C-Section: Peri or post mortem* (skip to question 69)
    10. Other _____
    99. Unknown

INTRAPARTUM-MEDICAL HISTORY

(Circle the one that applies, unless otherwise indicated.)

NOTE: SKIP THIS SECTION IF THE MOTHER DID NOT DELIVER OR IF A C-SECTION WAS PERFORMED PERI OR POST MORTEM

Stages of labor

60. First stage	61. Second stage	62. Third stage
# of hrs._____ min._____	# of hrs._____ min._____	# of hrs._____ min._____

Other pregnancy procedures

63. Ectopic pregnancy management *(circle all that apply)**
    0. None
    1. Laparoscopy
    2. Laparotomy
    3. Medical
    4. Other *(specify)* _____
    9. Unknown

64. Other operative procedures performed during delivery *(circle all that apply)**
    0. None
    1. Episiotomy repair
    2. Laceration repair
    3. Laparotomy
    4. Hysterectomy
    5. Tubal ligation
    6. D & C
    7. Salpingectomy/oophorectomy
    8. Other *(specify)* _____
    9. Unknown

POSTPARTUM

NOTE: UP TO 6 WEEKS, AFTER DELIVERY

NOTE: SKIP THIS SECTION IF THE MOTHER DID NOT DELIVER OR IF A C-SECTION WAS PERFORMED PERI OR POST MORTEM

65. Complications during postpartum *(circle all that apply)*
    - 0. None
    - 1. Embolism
    - 2. Hemorrhage
    - 3. Preeclampsia
    - 4. Eclampsia
    - 5. ARDS*
    - 6. Infection
    - 7. Cardiomyopathy
    - 8. Anesthesia
    - 9. Other *(specify)* _____
    - 99. Unknown

66. Was blood transfusion or blood product(s) indicated any time during postpartum hospitalization?
    - 0. No
    - 1. Yes (go to section a)

a. Was transfusion or blood product(s) *(circle all that apply)*
    - 1. Refused
    - 2. Delayed
    - 3. Administered

Referrals

67. Postpartum referrals or follow-ups *(circle all that apply)**
    - 0. None
    - 1. Obstetrician
    - 2. MFM specialist
    - 3. Internist
    - 4. Licensed midwife
    - 5. Specialist *(specify)* _____
    - 6. Other *(specify)*_____
    - 8. Data unavailable
    - 9. Unknown

68. Were referrals or follow-ups completed?
    - 0. No *(describe)*
    - 1. Yes
    - 8. Data unavailable
    - 9. Unknown

PSYCHOSOCIAL ASSESSMENT

69. Problems identified by mother's health care team*
(Circle all that apply, for each problem identified and action not taken comment in the space provided.)

Problem	Identified (0=No 1=Yes, 8= Data unavailable 9=Unknown)	Action taken (0=No 1=Yes 8= Data unavailable 9=Unknown)	Comments (Specify if occurred during prenatal, intrapartum, or postpartum period, if known)
0. None			
1. Battered during pregnancy	0. 1. 8. 9.	0. 1. 8. 9.	
2. Crime/legal problems	0. 1. 8. 9.	0. 1. 8. 9.	
3. Depression	0. 1. 8. 9.	0. 1. 8. 9.	
4. Disability (specify)_____	0. 1. 8. 9.	0. 1. 8. 9.	
5. Disturbed relationship with a child	0. 1. 8. 9.	0. 1. 8. 9.	
6. Employment/educational needs	0. 1. 8. 9.	0. 1. 8. 9.	
7. Frequent moves*	0. 1. 8. 9.	0. 1. 8. 9.	
8. Hazardous exposures at work	0. 1. 8. 9.	0. 1. 8. 9.	
9. Housing inadequate/homeless	0. 1. 8. 9.	0. 1. 8. 9.	
10. Inadequate support system	0. 1. 8. 9.	0. 1. 8. 9.	
11. Mother abused as a child	0. 1. 8. 9.	0. 1. 8. 9.	
12. Need for financial support	0. 1. 8. 9.	0. 1. 8. 9.	
13. Not compliant with treatment	0. 1. 8. 9.	0. 1. 8. 9.	
14. Poor dentition	0. 1. 8. 9.	0. 1. 8. 9.	
15. Poor nutrition	0. 1. 8. 9.	0. 1. 8. 9.	
16. Previous ACS case*	0. 1. 8. 9.	0. 1. 8. 9.	
17. Other mental illness (specify)_____	0. 1. 8. 9.	0. 1. 8. 9.	
18. Suicidal ideation	0. 1. 8. 9.	0. 1. 8. 9.	
19. Transportation problems	0. 1. 8. 9.	0. 1. 8. 9.	
20. Bereavement/family support	0. 1. 8. 9.	0. 1. 8. 9.	
21. Bereavement/surviving children	0. 1. 8. 9.	0. 1. 8. 9.	
22. Other (specify)_____	0. 1. 8. 9.	0. 1. 8. 9.	

23. Other comments

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DEATH FROM MISCARRIAGE OR TERMINATION OF PREGNANCY (TOP)
(Skip this section, if not applicable.)

70. Type of induced TOP *(circle all that apply)**
    0. None
    1. Instillation
    2. Suction/sharp curettage
    3. Dilatation & evacuation
    4. Elective abortion
    5. Medical abortion
    6. Vaginal suppository or gel
    7. Other *(specify)* _____
    9. Unknown

a. Was the TOP
    1. Elective
    2. Non-elective

71. If not TOP was this a
    1. Complete miscarriage
    2. Incomplete miscarriage
    3. Missed abortion
    4. Hydatidiform mole/trophoblastic disease
    5. Other *(specify)* _____

72. Date of miscarriage or TOP* _____/_____/_____

73. Weeks gestation* _____

a. Was gestation confirmed by ultrasound?
    0. No
    1. Yes
    8. Data unavailable
    9. Unknown

74. Where did TOP take place?*
    1. Hospital
    2. Clinic
    3. Doctor's office
    4. Other *(specify)*_____
    8. Data unavailable
    9. Unknown

75. Comments

CAUSE OF DEATH

76. Immediate cause of death as listed on the death certificate, if available_____
(Code 8, if death certificate is unavailable)

77. Death due to injury*
    0. None/no injury
    1. Intentional injury, homicide
    2. Intentional injury, suicide
    3. Unintentional injury MVA*
    4. Unintentional injury NOS/other*
    5. Injury, undetermined
    8. Data unavailable
    9. Unknown

78. Associated conditions leading to death*
(Code 8, if death certificate is unavailable)
    1st associated condition_____
    2nd associated condition _____
    3rd associated condition _____
    4th associated condition _____
    5th associated condition _____

AUTOPSY REPORT

79. Medical examiner *(circle all that apply)*
    1. Notified
    2. Refused
    3. Accepted
    8. Data unavailable
    9. Unknown

80. Was an autopsy performed?
    0. No
    1. Yes *(specify by whom)*
        1. Local hospital
        2. Medical examiner
        3. Private pathologist
        8. Data unavailable
        9. Unknown
    8. Data unavailable
    9. Unknown

81. Autopsy results* *(Code 8, if autopsy report is unavailable)*

82. Cause of death from autopsy report _____
(Code 8, if autopsy report is unavailable)

OVERALL TEAM ASSESSMENT

Cause of death

83. a. Immediate cause of death determined by maternal mortality review team

b. Final associated causes of death determined by maternal mortality review team

c. Is the immediate cause (from question 83. a) equivalent to the immediate cause on the death certificate (from question 76)?
_____ *(0=No, 1= Yes)*

d. Is the immediate cause (from question 83. a) equivalent to any cause (from questions 76 or 78) on the death certificate?
_____ *(0=No, 1= Yes)*

84. ACOG maternal mortality definition*
    1. Pregnancy related
    2. Pregnancy associated
    9. Unknown

Assessment of care

85. Was the care and/or services provided by the hospital and/or clinicians in accordance with national professionally recognized standards or guidelines?
    0. Not in accordance with standards
    1. In accordance with standards

86. If *not in accordance with standards* (question 85), classify areas where hospital and/or clinician deficiencies/problems in care were identified
    a. Physician, midwife or resident related

    b. Nursing related

    c. Support services (laboratory, x-ray, etc.) related

    d. System related

    e. Other

87. Did the failure in clinical management or occurrence of sub-standard care contribute to the mother's death?
    0. No
    1. Yes *(describe)*

External factors

88. Were problems identified related to the
    a. Patient

    b. Family or community

    c. Access to care

    d. Other

89. Did external factors contribute to the mother's death?
    0. No
    1. Yes *(describe)*

Recommendations

90. State recommendations (i.e., system modifications, revision of protocol (s) staffing modifications, policy change (s) etc.) for improvement of care of the areas reviewed.

Maternal Death Abstraction Form: Instruction Manual

New York State Safe Motherhood Initiative

Section I- Introduction

This manual documents specifications for coding and entry of items that will be tabulated from the maternal death abstraction form by the American College of Obstetricians and Gynecologists District II NY (ACOG). These specifications are intended for use by the maternal mortality review team and appointed ACOG personnel.

Section II- General procedures for hard copies and electronic files

A. Receipts

ACOG will receive the abstraction form in hard copy and enter the information in the maternal death database; including all maternal deaths reported through the maternal death notification form and record linkages. In general, data are entered at regular intervals dependent on the occurrence rate. A maternal death abstraction form need not be "perfect" to qualify for entry. Each abstraction form shall contain all detailed information obtained from the medical record(s), staffing logs and interviews with health care providers who had contact with the deceased.

B. Processing

Upon receipt of the abstraction form, ACOG will:

- Check for completeness, individual item code validity and inconsistencies between data items.
- Enter abstraction form in the maternal death database.
- Notify the review team of any problems.
- Review database files for inconsistencies or inadequate reporting of certain items, including coding, system and software errors.
- Investigate all differences that are judged to have consequences for quality and completeness.

In the review process, statistical tests are used to call initial attention to differences for possible follow-up. As necessary, the maternal mortality review team is informed of differences encountered in entry and asked to verify the counts or to determine the nature of the inconsistencies. Missing data (except those permanently voided) and other problems detected will be resolved and corrections will made by ACOG personnel.

C. Security

The database will be utilized for all the maternal deaths reviewed. The database will be protected by passwords and only appointed ACOG personnel will have access to the database. Back up files will be retained in secured, locked and fire proof storage.

Section III- Maternal death data abstraction form coding instructions

This section provides coding instructions for items in the maternal death data set. Items are to be coded as reported on the medical records, staffing logs and interviews with health care providers who had contact with the deceased. Numbering of items is *not* consecutive. **Only those items that need coding instructions are included.**

General instructions

- *Prenatal hospitalizations items (37-42) coding instructions are combined for the four hospitalization sections.*
- *Abstraction form items should not be left blank, unless otherwise indicated.*

Item	Coding Instructions
1. Case registry number	Enter the 9-digit code assigned by ACOG on the maternal death notification form (MDNF).
2. Date of death	Code date of death *MM/DD/YYYY* If any part of the date is not reported, code only the missing component 99 (unknown). *Example: 04/99/2002*
Month	January..... 01 February..... 02 March..... 03 April..... 04 May..... 05 June..... 06 July..... 07 August..... 08 September..... 09 October..... 10 November..... 11 December..... 12
Day	01-31
Year	Enter four-digit year. Year of death must be reported.
3. Time of death	Code the earliest time of death reported, as stated on the death certificate. Code and convert to a 24-hour time period.

Item	Coding Instructions
4. Was pregnancy checked on the death certificate?	Code as stated on the death certificate. If pregnancy was checked, code accordingly.
Demographic Information *NOTE:* ▪ *Information to be obtained from the prenatal record.* ▪ *Code items as reported on the medical record, unless otherwise indicated.*	
6. Mother's date of birth	Code date of birth *MM/DD/YYYY* See item #2
7. Mother's place of birth State Country a. Year entered the U.S	Code country and state based on Appendixes A & B. Refer to Appendix A Refer to Appendix B Code four-digit year entered the U.S.
8. Zip code of residence	Code five digit zip code of residence.
10. Race	If the race entry cannot be coded as 1-14, code 15 (other) and specify.
15. Educational level	Code the highest grade completed. If year reported is with a fraction or symbol such as +, -, ?, etc., ignore fraction or other symbol and code accordingly. If the entry for college is reported as one semester to five years, with no degree, code 4 (some college credit, but no degree).
16. Type of financial coverage/medical insurance a. Primary payer	If financial coverage cannot be coded as 1-7, code 8 (other) and specify. Specify the primary payer source from the list provided.
Past Pregnancies *NOTE:* ▪ *Information to be obtained from the prenatal record.* ▪ *Code items as reported on the medical record, unless otherwise indicated.*	
17. Parity #	Parity number does not include the index pregnancy.

Item	Coding Instructions
18. Past pregnancies	Code the most recent six pregnancies. Include abortions and ectopic pregnancies. Year: Code four-digit year. Weeks gestation: Round fractional weeks to the nearest week. Pregnancy outcome: Code Live Birth (LB), Stillbirth (SB), Neonatal Death (NND)
Prenatal-Medical History *NOTE:* ▪ *Information to be obtained from the prenatal record.* ▪ *Code items as reported on the medical record, unless otherwise indicated.*	
19. Indicate source of prenatal information	If prenatal information source cannot be coded as 1-3, code 4 (other) and specify.
20. Prenatal care source a. Did the mother receive high-risk referral(s)? b. Did the mother receive high-risk care as a result of the referral(s)?	1. Health department clinic: Ambulatory services provided by a state/county/city health department clinic. 2. Hospital clinic: Ambulatory services provided by a hospital facility. 3. Neighborhood health center: Ambulatory services provided by a community based facility for normal to low risk maternity care. 4. High-risk clinic: Specialized ambulatory services provided for high-risk patients. 5. Private office: Ambulatory services provided by a non-governmental health care provider or partnerships.
21. Was there any relevant past obstetric and/or medical history prior to the index pregnancy?	Collect and describe all reported factors corresponding to past obstetric and medical history prior to index pregnancy. Example: Anemia, cardiac disease, acute or chronic lung disease, diabetes, genital herpes, chronic hypertension, renal disease, chronic illness, previous pregnancy complications, etc.

Item	Coding Instructions
25. Gestation at first prenatal visit	See item #18 for weeks gestation coding. Code weeks gestation at first prenatal visit. If the information is unavailable, code 88 (data unavailable). If the information is unknown, code 99 (unknown).
26. Weight recorded at initial prenatal visit	Enter weight in pounds. Round to the nearest pound.
27. Final EDD Month Day Year a. Was the final EDD confirmed by sonogram?	See item # 2
28. No. of prenatal visits	The number of prenatal visits includes maternal fetal medicine (MFM) consultations. Coding examples: 4 visits code "04", none or – code "00", unknown or ? code "99".

Item	Coding Instructions
29. Concurrent prescribed and OTC medications dietary supplements and herbs used during pregnancy	Concurrent: Medications or dietary supplements used for a particular span, daily or once a week during pregnancy. Specify type of dietary supplements used. Dietary supplements: Vitamins, minerals, herbs or other botanical substances; an amino acid, a dietary substance for use by man to supplement the diet by increasing the total daily caloric intake; a concentrate, metabolite, constituent extract; or, combinations of these ingredients. Example of herbs: Dandelion, echinacea, ginseng, lobelia, St. John's wort, thyme, red raspberry leaves, black cohosh root, squaw vine herb, dong quai root, butcher's broom root.
31. Alcohol use during pregnancy a. Type of alcohol b. Frequency of alcohol use per week	If coded 1 (yes) on alcohol use: ♦ Describe type of alcohol and number of drinks per week. Examples: Beer, liquor, wine
32. Illicit drug use during pregnancy a. Frequency of drug use per day b. Dependency to drug(s)	Specify the amount of drug used per day.
33. Specify drug(s)	If drug(s) reported cannot be coded as 1-10, code 11 (other) and specify.
35. Was the mother at no risk, risk, high risk or very high risk? a. Was the baby at no risk, risk, high risk or very high risk?	Determined and coded by unanimous decision of the maternal mortality review team.
36. Provider identified risk factors	Determined and coded by unanimous decision, of the maternal mortality review team. Anemia: < 10 g/dl Hypertension: > 140/90 mmHg or requiring medications

Item	Coding Instructions
Prenatal Hospitalization(s) *NOTE:* ▪ *Skip this section if the mother had no prenatal hospitalizations, excluding the admission ending in delivery.* ▪ *If the mother was admitted to a higher or lower level hospital and then transferred to another hospital, complete a second hospitalization section.* ▪ *Complete for each prenatal hospitalization.* ▪ *Information to be obtained from the medical record.* ▪ *Code items as reported on the medical record(s), unless otherwise indicated.*	
37a-d. Level of hospital	Refer to Appendix C
38a-d. Date of admission Month Day Year	See item #2
39a-d. Time of admission	See item #3
40a-d. Admission diagnosis/condition	Specify gestational age, reason(s), admission and discharge diagnosis and length of stay, etc.
42a-d. Was the patient transferred to a higher level of care, due to complications or possible complication(s) during the hospitalization?	Refer to Appendix C for level of hospital.
Intrapartum-Medical History *NOTE:* ▪ *Information to be obtained from the Intrapartum medical record.* ▪ *Code items as reported on the medical record, unless otherwise indicated.*	
43. Place of delivery	Refer to Appendix C for level of hospital. If the place of delivery cannot be coded as 1-6, code 7 (other) and specify.
44. Date of admission	See item #2
45. Time of admission	See item #3
46. Weeks gestation at delivery	See item #18 for weeks gestation coding. Enter the weeks gestation at delivery.

Item	Coding Instructions
47. Height	Enter height in inches. Round to the nearest inch.
48. Weight recorded prior to delivery	See item #26
50. Obstetric complications	If the obstetric complication(s) cannot be coded as 0-8, code 9 (other) and specify. Hemorrhage: > 500cc, greater than expected from delivery modality Hemolysis Elevated Liver Enzymes and Low Platelet count (HELLP) syndrome
51. Placental complications	If the placental complication(s) cannot be coded as 0-5, code 6 (other) and specify.
52. Type of anesthesia for L & D	If the type of anesthesia reported cannot be coded as 0-7, code 8 (other) and specify. Combined spinal-epidural (CSE) Monitored Anesthesia Care (MAC)
56. Type of L & D provider	Code information obtained from hospital's physician credential records. Obstetrician (board certified): Certified by the American Board of Obstetrics and Gynecology (ABOG) Obstetrician (trained not certified): No proof of certification by ABOG Maternal Fetal Medicine (MFM) specialist: Certified, fellowship or trained by ABOG and specialized certification in maternal fetal medicine
57. Pregnancy outcome	If the outcome reported cannot be coded as 0-6, code 7 (other) and specify. Undelivered: Died pregnant Stillborn(s): Born > 20 weeks Spontaneous abortions: Include all types

Item	Coding Instructions
58. Describe newborn's status and time of birth	Indicate if the newborn was alive or dead include time of birth, birth weight, APGAR score, length of stay, cord pH and specify any complication(s), if available.
59. Type of delivery	If type of delivery reported cannot be coded as 0-4, code 5 (other) and specify. Normal Spontaneous Vaginal Delivery (NSVD) Vaginal Birth After C-Section (VBAC) C-Section: Unscheduled non-emergent: Maternal or fetal compromise, not immediately life threatening C-Section: Emergent: Immediate maternal or fetus threat C-Section: Peri or post mortem: Mother died or undergoing CPR
63. Ectopic pregnancy management	If the type of ectopic pregnancy management cannot be coded as 0-3, code 4 (other) and specify.
64. Other operative procedures performed during delivery	If type of operative procedure cannot be coded as 0-7, code 8 (other) and specify.
Postpartum *NOTE:* ▪ *Up to 6 weeks after delivery.* ▪ *Information to be obtained from the Intrapartum medical record.* ▪ *Code items as reported on the medical record, unless otherwise indicated* ▪ *Skip this section if the mother did not deliver or if a c-section was performed peri or post mortem*	
65. Complications during postpartum	If complications during postpartum cannot be coded as 1-8, code 9 (other) and specify. Adult Respiratory Distress Syndrome (ARDS)
67. Postpartum referrals or follow ups	If the type of referral cannot be coded as 0-5, code 6 (other) and specify. Maternal fetal medicine (MFM)

Item	Coding Instructions
Psychosocial Assessment *NOTE:* ▪ *Information to be obtained from the Prenatal and the Intrapartum medical record(s).* ▪ *Code items as reported on the medical record(s), unless otherwise indicated.*	
69. Problems identified by mother's health care team	If the problems identified cannot be coded as 0-21, code 22 (other) and specify. Frequent moves: > 3 moves in less than 2 months Adult and child services (ACS)
Death from miscarriage or termination of pregnancy (TOP) *NOTE:* ▪ *Skip section, if not applicable.* ▪ *Code items as reported on the medical record, unless otherwise indicated.*	
70. Type of induced TOP a. Was the TOP elective or non-elective	If type of induced TOP cannot be coded as 0-6, code 7 (other) and specify.
72. Date of miscarriage or TOP Month Day Year	See item #2
73. Weeks of gestation a. Was gestation confirmed by ultrasound?	See item #18 for weeks gestation coding. Code the weeks gestation at miscarriage or TOP.
74. Where did TOP take place?	If the location cannot be coded as 1-3, code 4 (other) and specify.

Item	Coding Instructions
Cause of death *NOTE:* ▪ *Information to be obtained from the medical record and the death certificate.* ▪ *Code items as reported on the medical record, unless otherwise indicated.*	
77. Death due to injury	If immediate cause of death was due to injury, circle the type of injury. Motor vehicle accident (MVA) Not otherwise specified (NOS)
78. Associated conditions leading to death.	List the five conditions that most directly contributed to the cause of death. Rank and list the conditions that had greatest impact first, as listed (e.g., due to or as a consequence of) on the death certificate.
Autopsy report *NOTE:* ▪ *Information to be obtained from the autopsy report.* ▪ *Code items as reported on the autopsy report, unless otherwise indicated.*	
81. Autopsy results	Describe pertinent results and include toxicology report, if available.
Overall team assessment *NOTE:* ▪ *Information to be obtained from all the medical records, interviews with health care providers and staffing logs reviewed.* ▪ *Determined and coded by unanimous decision, of the review team.*	
84. ACOG maternal mortality definition	1. Pregnancy related: The death of a woman while pregnant or within 1 year of termination of pregnancy, irrespective of the duration and site of the pregnancy, from any cause related to or aggravated by her pregnancy or its management, but from accidental or incidental cause. 2. Pregnancy associated: The death of a woman while pregnant or within 1 year of termination of her pregnancy, *irrespective of cause.*

Appendix A			
State	**Code**	**State**	**Code**
Alabama	01	Oklahoma	37
Alaska	02	Oregon	38
Arizona	03	Pennsylvania	39
Arkansas	04	Rhode Island	40
California	05	South Carolina	41
Colorado	06	South Dakota	42
Connecticut	07	Tennessee	43
Delaware	08	Texas	44
District of Columbia	09	Utah	45
Florida	10	Vermont	46
Georgia	11	Virginia	47
Hawaii	12	Washington	48
Idaho	13	West Virginia	49
Illinois	14	Wisconsin	50
Indiana	15	Wyoming	51
Iowa	16	Puerto Rico	52
Kansas	17	Virgin Islands	53
Kentucky	18	Guam	54
Louisiana	19		
Maine	20		
Maryland	21		
Massachusetts	22		
Michigan	23		
Minnesota	24		
Mississippi	25		
Missouri	26		
Montana	27		
Nebraska	28		
Nevada	29		
New Hampshire	30		
New Jersey	31		
New Mexico	32		
New York	33		
North Carolina	34		
North Dakota	35		
Ohio	36		

Appendix B			
Country	**Code**	**Country**	**Code**
Afghanistan, Islamic State of	1	Cambodia, Kingdom of	36
Albania	2	Cameroon	37
Algeria	3	Canada	38
American Samoa	4	Cape Verde	39
Andorra, Principality of	5	Cayman Islands	40
Angola	6	Central African Republic	41
Anguilla	7	Chad	42
Antarctica	8	Chile	43
Antigua and Barbuda	9	China	44
Argentina	10	Christmas Island	45
Armenia	11	Cocos (Keeling) Islands	46
Aruba	12	Colombia	47
Australia	13	Commercial	48
Austria	14	Comoros	49
Azerbaidjan	15	Congo	50
Bahamas	16	Congo, Democratic Rep	51
Bahrain	17	Cook Islands	52
Bangladesh	18	Costa Rica	53
Barbados	19	Croatia	54
Belarus	20	Cuba	55
Belgium	21	Cyprus	56
Belize	22	Czech Republic	57
Benin	23	Denmark	58
Bermuda	24	Djibouti	59
Bhutan	25	Dominica	60
Bolivia	26	Dominican Republic	61
Bosnia-Herzegovina	27	East Timor	62
Botswana	28	Ecuador	63
Bouvet Island	29	Educational	64
Brazil	30	Egypt	65
British Indian Ocean Territory	31	El Salvador	66
Brunei Darussalam	32	Equatorial Guinea	67
Bulgaria	33	Eritrea	68
Burkina Faso	34	Estonia	69
Burundi	35	Ethiopia	70

Appendix B contd'			
Country	**Code**	**Country**	**Code**
Falkland Islands	71	Indonesia	105
Faroe Islands	72	International	106
Fiji	73	Iran	107
Finland	74	Iraq	108
Former Czechoslovakia	75	Ireland	109
Former USSR	76	Israel	110
France	77	Italy	111
France (European Territory)	78	Ivory Coast (Cote D'Ivoire)	112
French Guyana	79	Jamaica	113
French Southern Territories	80	Japan	114
Gabon	81	Jordan	115
Gambia	82	Kazakhstan	116
Georgia	83	Kenya	117
Germany	84	Kiribati	118
Ghana	85	Kuwait	119
Gibraltar	86	Kyrgyz Republic (Kyrgyzstan)	120
Great Britain	87	Laos	121
Greece	88	Latvia	122
Greenland	89	Lebanon	123
Grenada	90	Lesotho	124
Guadeloupe (French)	91	Liberia	125
Guam (USA)	92	Libya	126
Guatemala	93	Liechtenstein	127
Guinea	94	Lithuania	128
Guinea Bissau	95	Luxembourg	129
Guyana	96	Macau	130
Haiti	97	Macedonia	131
Heard and McDonald Islands	98	Madagascar	132
Holy See (Vatican City State)	99	Malawi	133
Honduras	100	Malaysia	134
Hong Kong	101	Maldives	135
Hungary	102	Mali	136
Iceland	103	Malta	137
India	104	Marshall Islands	138

Appendix B contd'			
Country	**Code**	**Country**	**Code**
Martinique (French)	139	Panama	170
Mauritania	140	Papua New Guinea	171
Mauritius	141	Philippines	172
Mayotte	142	Pitcairn Island	174
Mexico	143	Poland	175
Micronesia	144	Polynesia (French)	176
Moldavia	145	Portugal	177
Monaco	146	Puerto Rico	178
Mongolia	147	Qatar	179
Montserrat	148	Reunion (French)	180
Morocco	149	Romania	181
Mozambique	150	Russian Federation	182
Myanmar	151	Rwanda	183
Namibia	152	S Georgia & S Sandwich Isls	184
NATO	153	Saint Helena	185
Nauru	154	Saint Kitts & Nevis Anguilla	186
Nepal	155	Saint Lucia	187
Netherlands	156	Saint Pierre and Miquelon	188
Netherlands Antilles	157	Saint Tome (Sao Tome) and Principe	189
Network	158	Saint Vincent & Grenadines	190
Neutral Zone	159	Samoa	191
New Caledonia (French)	160	San Marino	192
New Zealand	161	Saudi Arabia	193
Nicaragua	162	Senegal	194
Niger	163	Seychelles	195
Nigeria	164	Sierra Leone	196
Niue	165	Singapore	197
Non-Profit Making Organizations (sic)	166	Slovak Republic	198
Norfolk Island	167	Slovenia	199
North Korea	168	Solomon Islands	200
Northern Mariana Islands	169	Somalia	201
Norway	170	South Africa	202

Appendix B contd'			
Country	**Code**	**Country**	**Code**
South Korea	203	Vanuatu	236
Spain	204	Venezuela	237
Sri Lanka	205	Vietnam	238
Sudan	206	Virgin Islands (British)	239
Suriname	207	Virgin Islands (USA)	240
Svalbard and Jan Mayen Islands	208	Wallis and Futuna Islands	241
Swaziland	209	Western Sahara	242
Sweden	210	Yemen	243
Switzerland	211	Yugoslavia	244
Syria	212	Zaire	245
Tadjikistan	213	Zambia	246
Taiwan	214	Zimbabwe	247
Tanzania	215		
Thailand	216		
Togo	217		
Tokelau	218		
Tonga	219		
Trinidad and Tobago	220		
Tunisia	221		
Turkey	222		
Turkmenistan	223		
Turks and Caicos Islands	224		
Tuvalu	225		
Uganda	226		
Ukraine	227		
United Arab Emirates	228		
United Kingdom	229		
United States	230		
Uruguay	231		
USA Government	232		
USA Military	233		
USA Minor Outlying Islands	234		
Uzbekistan	235		

Appendix E

Sample Maternal Mortality Review Case Abstraction Forms (CDC)*

* Developed by the Division of Reproductive Health, CDC.

Module 1: Vital Records Data

Death Certificate Data

1. Social Security Number _____
2. Name _____
3. Date of birth _____
4. Birthplace (city and state or foreign country) _____
5. City or town, state, zip code _____
6. Decedent's education _____
7. Marital status at time of death _____
8. Race _____
9. Ethnicity _____
10. Usual occupation _____
11. Type of business/industry _____
12. Date/time of death _____
13. Place of death (name/location) _____
    Type of place _____
    Level of care (if applicable) _____
14. Cause of death _____
    Interval _____
15. Immediate cause (1) _____
    Due to (2) _____
    Due to (3) _____
    Due to (4) _____
16. Other significant conditions contributing to death but not resulting in cause (1)
    _____
17. Was an autopsy performed? _____
    Were autopsy findings available to complete the cause of death? _____
18. Was a pregnancy checkbox listed on the death certificate? _____
    If so, how was it completed? _____

Notes:

Live Birth or Fetal Death Certificate Data

19. Mother's medical record number _____
20. Date/time of delivery _____
21. Place of delivery (name/location) _____
    Type of place _____
    Level of care (if applicable) _____
22. Was woman transferred prior to delivery? _____
    From where? _____
23. Attendant /type _____

Father Characteristics

24. Father of child _____
25. SSN _____
26. DOB _____
27. Birthplace _____
28. Education _____
29. Race _____
30. Ethnicity _____
31. Usual occupation _____

Newborn Characteristics

32. Newborn _____
33. Sex _____
34. Birth weight _____
35. Obstetric estimate of gestation (completed weeks) _____
36. Apgar score _____

Mother Characteristics

37. Plurality _____
38. Pregnancy history _____
39. Mother's height _____
40. Mother's prepregnancy weight _____
41. Mother's weight at delivery _____
42. Number of previous live births (do not include this child) _____
43. Number of children now living _____
44. Number of children now dead _____

45. Number of other pregnancy outcomes (spontaneous or induced losses or ectopic pregnancies) _____
46. Number of other outcomes _____
47. Date of last live birth _____
48. Date of last other pregnancy outcome _____
49. Date of last missed period _____
50. Date of first prenatal care visit _____
51. Date of last prenatal care visit (or "none") _____
52. Total number of prenatal visits _____
53. Did mother receive WIC food for herself during this pregnancy? _____
54. Cigarette smoking before and during pregnancy _____
55. Principal source of payment for this delivery _____
56. Medical conditions during this pregnancy _____
57. Obstetric procedures _____
58. Labor onset/characteristics _____
59. Method(s) of delivery: attempted/used _____
60. Fetal presentation at birth _____
61. Maternal complications associated with labor and delivery _____
62. Abnormal conditions of the newborn _____
63. If stillbirth, cause of death _____
64. If neonatal death, cause of death _____

Notes:

Module 2: Autopsy/Coroner Report

1. Report made by medical examiner, coroner, or other (please specify)?

   _____

2. Weight at time of death _____
3. Height at time of death _____
4. Fetus (weight/length/gestational age) _____
5. Relevant findings (e.g., uterus, lungs, brain, placenta) _____

   Gross:

   Microscopic:

   Toxicology:

6. Cause of death from autopsy report:

Underlying	_____	ICD code	_____
Acute	_____	ICD code	_____
Associated	_____	ICD code	_____
	_____	ICD code	_____
	_____	ICD code	_____

Notes:

Module 3: Prenatal Care Record

1. Place/type of prenatal care _____
2. Provider/type _____
3. Payment source for prenatal care _____
4. Was pregnancy planned? _____
5. Was patient using birth control? _____
6. Date stopped using birth control _____
7. Medical conditions or surgery prior to index pregnancy _____
8. Duration/date _____
9. Diagnosis prior to pregnancy _____
10. Medications (including over-the-counter/herbal) _____
    Prior to pregnancy _____
    During pregnancy _____
11. Tobacco/alcohol/drug use (type, route, when) _____
12. Did patient receive counseling/education? _____
13. Family history relevant to woman's death _____
14. Reproductive history (gravidity, parity) _____
15. For each pregnancy: date, outcome, gestational age, birth weight, mode of delivery/termination, complications _____
    _____
    _____
16. Did this pregnancy result from assisted reproductive technologies?
    If yes, describe in further detail _____
    _____
    _____
17. Prepregnancy weight, height, first visit weight, last visit weight (date) _____
    _____
    _____
18. Last menstrual period, first ultrasound date, gestational age, estimated date of confinement _____
    _____
    _____
19. Number of fetuses _____
20. Prenatal care _____

21. First prenatal care visit date, gestational age _____
22. Total number of visits _____
23. Problems identified in pregnancy _____
    Date(s) _____
24. Procedures during pregnancy _____
    Date(s) _____
25. Hospitalizations/emergency room visits during pregnancy _____
    Date(s) _____
26. Referrals made to specialists? _____
    If so, type and reason _____
27. Were referral appointments kept? _____

28.

	Blood pressure		**Urine protein**	
	Date	**Result**	**Date**	**Result**
Initial visit or initial test				
First elevated Blood pressure >140/90 Urine protein ≥1				
Highest				
Last visit				

29.

Laboratory values		
Test	**Date**	**Results**
HCT		
GTT		
GBS		
Urine culture		

30. Other relevant lab results

31. Summary of prenatal period and care

Module 4 AP: Hospital Records for Antepartum/Postpartum Hospitalizations (Nondelivery)

1. Date and time of admission to hospital _____
2. Date and time of discharge/death _____
3. Place/type of facility _____
   Level of care _____
   Medical record number _____
4. Provider/type _____
5. Payment source for this hospitalization _____

_____

6. Was patient pregnant on admission? _____
   If no, date and time pregnancy ended _____
7. Was she alive on discharge? _____
8. Did she die undelivered? _____
9. Means of transportation to hospital/travel time to get to hospital _____

_____

10. Was this a transfer from another facility? _____
    If so, which one? _____
11. If admitted through ER, date/time arrived in ER _____
12. Parity/gravidity/LMP/EDC/date of delivery (if applicable) _____

_____

_____

13. Relevant prior history _____

_____

_____

14. Duration of signs and symptoms prior to arrival _____

_____

15. Reason for admission _____

_____

16. Admission vital signs (T/P/R/BP) _____

_____

17. Height/weight _____
18. If deceased, clinical cause of death _____
19. Summary of hospital course (include relevant physical exam, medications, transfusions, tests, lab/imaging results, procedures, surgery, referral/consultations, and transfers) _____

_____

_____

Module 4 DEL: Hospital Records for Delivery (Live birth/Stillbirth)

1. Date and time of admission to hospital _____
2. Date and time of discharge/death _____
3. Place/type of facility _____
   Level of care _____
   Medical record number _____
4. Provider/type _____
5. Attendant(s) at delivery _____

_____

6. Other providers or specialists involved in care? Type/reason _____

_____

_____

7. Payment source for this hospitalization _____

_____

8. Was she alive on discharge? _____
9. Means of transportation to hospital/travel time to get to hospital _____

_____

_____

10. Was this a transfer from another facility? _____
    If so, which one? _____
11. If admitted through ER, date/time arrived in ER _____
12. Parity/gravidity/LMP/EDC/date of delivery (if applicable) _____

_____

_____

13. Relevant prior history _____

_____

_____

14. Duration of signs and symptoms prior to arrival _____

_____

_____

15. Reason for admission _____

_____

16. Admission vital signs (T/P/R/BP) _____

_____

17. Height/weight _____

_____

18. Labor (date/time of on set) _____
19. ROM (date/time); spontaneous vs. artificial? (circle one) _____
20. Were tocolytic agents used? Type? Method? Reason? _____

21. Was labor induced? Type? Method? Reason? _____

22. Augmented? Type? Method? Reason? _____

23. Anesthesia: labor _____
24. Anesthesia: delivery _____
25. Date/time of delivery; method of delivery; if cesarean section, give reason

26. Number of fetuses _____
27. Fetal presentation _____
28. Estimated blood loss _____
29. Infant outcome: born alive/dead _____
30. If woman deceased, clinical cause of death _____
31. Summary of hospital course (include relevant physical exam, medications, transfusions, tests, lab/imaging results, procedures, surgery, referral/consultations, and transfers) _____

Module 4 ECT: Hospital Records for Ectopic/Abortions

1. Date and time of admission to hospital _____
2. Date and time of discharge/death _____
3. Place/type of facility _____
   Level of care _____
   Medical record number _____
4. Provider/type _____
5. Other providers or specialists involved in care? Type/reason _____

_____

_____

6. Payment source for this hospitalization _____
7. Was patient pregnant on admission? _____
   If no, date and time pregnancy ended _____
8. Was she alive on discharge? _____
9. Means of transportation to hospital/travel time to get to hospital

_____

10. Was this a transfer from another facility? _____
    If so, which one? _____
11. If admitted through ER, date/time arrived in ER _____
12. Parity/gravidity/LMP/EDC/date of delivery (if applicable) _____

_____

_____

13. Did she have any prenatal care in this pregnancy? _____
    If so, first prenatal care visit date, gestational age, total number of visits _____
14. Relevant events in index pregnancy prior to admission _____

_____

15. Duration of signs and symptoms prior to arrival _____

_____

16. Reason for admission _____

_____

17. Admission vital signs (T/P/R/BP) _____

_____

18. Height/weight _____
19. If deceased, clinical cause of death _____
20. Summary of hospital course (include relevant physical exam, medications, transfusions, tests, lab/imaging results, procedures, surgery, referral/consultations, and transfers) _____

_____

Module 5: Social Services

1. Sources of data (who and where) _____
2. Mental/physical health status and conditions, including depression and substance abuse _____

_____

_____

3. Source of income (work, welfare, part-time, full-time, etc.) _____
   If working, occupation _____
4. Type of housing (own, rent, public housing) _____
5. Other people in household _____

_____

6. Time at address (frequency of moves) _____

_____

7. Incarcerated/homeless _____

_____

8. Support systems (partner, family, friends, church) _____

_____

9. Citizen/immigration status _____
   How long in the United States? _____
10. Communication barriers (e.g., language [who interprets?]; physical disability)

_____

_____

11. Cultural beliefs that would interfere with woman receiving care _____

_____

_____

12. Was pregnancy intended/desired? _____
13. Contraceptive use _____
14. Knowledge of pregnancy and pregnancy complications _____

_____

15. Health and social care access, including transportation, child care, and financial constraints _____

_____

_____

16. Did patient miss appointments or referrals (including medical specialists)? If so, type of appointment, reason for appointment, and reason for missing appointment, if known _____

_____

_____

_____

17. Was she referred to social services or other counseling services? Was she enrolled in special programs for pregnant women such as WIC or Healthy Start? If so, did she participate in the program(s)? If no, why not? _____

18. Patient's satisfaction with care of all types _____

19. Were there any areas of stress (e.g., physical, emotional, financial, safety) that were noted to affect the woman? _____

20. Other information relevant to actions or activities that led to the woman's death

Module 6: Committee Worksheet

Case Summary

1. Age _____
2. Race _____
3. Ethnicity _____
4. Nativity _____
5. Gravidity, parity, delivery date, pregnancy outcome, gestational age

_____

6. Date of death _____
7. Cause of death (immediate/underlying) _____
8. Is this equivalent to the cause listed on the death certificate? _____
9. Synopsis of events leading to death _____

_____

_____

_____

_____

_____

Questions to Consider in Case Assessment

10. Prior to pregnancy:
    a. Did the woman have a serious preexisting condition? _____
    b. Was the condition diagnosed? _____
    c. Was the patient counseled about risk of pregnancy? _____
    d. Was birth control being used? _____
       If not, why not? _____
       Did birth control fail? _____

<u>Patient Factors</u>

11. Was the pregnancy planned? _____
12. Did the patient seek care in a timely fashion (e.g., prenatal, abortion)? _____
    If no, why not? _____
13. Was the patient aware that she had a medical problem? _____
14. Did the patient comply with medical advice? _____
    If not, why not? _____

_____

<u>Medical Care System</u>

15. Was the woman able to get care when she sought it? _____
16. Did the women have prenatal care at the appropriate level? _____

17. Did she receive any needed referrals? _____

18. Did she need to be transferred before labor? During labor? After labor?

_____

_____

If yes, was she transferred? _____

If not, why not? _____

19. Did the woman receive correct care in a timely fashion? _____

_____

_____

Review Committee Opinion

20. Principal cause of death _____

21. Was the death pregnancy-related or not? _____

22. What factors, if any, could have been changed to decrease the risk of death?

_____

_____

_____

23. Recommendations to reduce deaths from similar causes or circumstances

_____

_____

_____

_____

_____

_____

Final Classification of Death (circle one)

- Pregnancy-related: Death resulting from 1) complications of the pregnancy itself, 2) the chain of events initiated by the pregnancy, or 3) aggravation of an unrelated condition by the physiologic or pharmacologic effects of the pregnancy that subsequently caused death during pregnancy or within 1 year of termination of pregnancy, regardless of the duration or anatomical site of pregnancy.

- Not pregnancy-related.

- Not pregnancy-associated.

Appendix F

Sample Maternal Mortality Review Confidentiality Agreement*

* Adapted with permission from the New Mexico Maternal Mortality Review Committee.

I understand that the **[Insert your state]** Maternal Mortality Review (MMR) process is designated and conducted under the authority of the state department of health for the purpose of reducing morbidity and mortality.

I further understand that all information gathered in connection with this process is confidential and cannot be released in any form to any party outside of the staff and membership of the **[Insert your state]** MMR process.

I agree:

1. To maintain the confidentiality of all decedent-specific identifying information exchanged, gathered, or learned in connection with my work with the MMR process.

2. Not to disclose this information to any third party in any form.

3. Not to reproduce, maintain copies, or take notes on any decedent-specific identifying information connected to the work of the MMR process after the case has been discussed by the review committee. All such information shall be turned over to the MMR staff, who will maintain all records in a secured area until the information is entered into the MMR database. After database entry, identifiers will be discarded.

4. To report any requests for any information to the MMR coordinator.

By my signature, I represent that I have had the opportunity to ask questions about the confidentiality of MMR information and fully understand the obligation to maintain confidentiality.

I also understand that disclosure of confidential information would result in my immediate termination from the MMR committee.

_____ _____

Committee Member Date

_____ _____

Witness Date

Appendix G

Sample Maternal Mortality Review Recommendations and Action Plan Form

MMR ID No. _____ **Date of Review** _____

Problem/Issue No. 1

Recommendation

Target System/Population

Proposed Action

Problem/Issue No. 2

Recommendation

Target System/Population

Proposed Action